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East Europe Report

ECONOMIC AND INDUSTRIAL AFFAIRS

No. 2409

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CONTENTS

JOINT VENTURES WITHIN CEMA FRAMEWORK EXAMINED

Prague HOSPODARSKE NOVINY in Czech 15 Apr 83 p 3

[Article by Vratislav Valek, Candidate for Doctor of Science, Financial and Credit System Research Institute: "The Path to the Realization of Economic Advantages: Joint Ventures Within the CEMA Framework"]

[Text] Among the near-term prospects for the socialist integrational process, increased emphasis is being placed on the development of direct relationships between interested organs and organization of the CEMA member countries. Joint ventures are a significant component of these relations, even though the setting up and operation of them is only in its initial phases. Prior to the adoption of the Comprehensive Program, it was a matter in this area of sporadic cases which took advantage of the specific conditions of a given production process on a bilateral basis. Throughout the seventies and at the beginning of the eighties this process speeded up a little bit, even though there still exists in this field a considerable amount of underutilized potential. This article follows one published in HOSPODARSKE NOVINY, No 4/1983, entitled "Emphasis on Expanding Direct Relations." Broadly speaking, it clarifies the correctness of the current orientation toward the development of direct relationships within the framework of CEMA.

Within the CEMA roughly 55 international economic organizations are currently in operation, of which 8 are joint ventures (2 arose prior to the adoption of the Comprehensive Program, 6 during its subsequent implementation). An answer to the question of why there had not been greater development in the past of this clearly progressive form of socialist economic integration may be based on a thorough analysis of the practical findings and experiences which have so far been gained and based on a definition of the essential preconditions and conditions for the successful khozraschet operation of such an entity.

Current Development

It is a very interesting paradox that despite their relatively small numbers joint ventures are among the most successful international economic organizations of the CEMA member countries, whether one is speaking of an obvious way to satisfy requirements for certain products and services that are in short supply or of the actual financial management of these organizations. At

the same time, it is not very difficult to explain this paradox. The founding of a joint venture requires strong incentives for all participating parties to solve a given problematical economic situation. In the past, the most favorable conditions for these incentives have existed primarily at the bilateral level, which is attested to by the fact that to date within the CEMA only a single multilateral joint venture (Interlichter) has been set up.

The bilateral character of economic cooperation within a joint venture also makes it feasible to resolve a further serious problem in their existence, that is, the need for compromise in overcoming the shortcomings which still exist in the mechanism of socialist economic integration, the higher forms of which also place qualitatively new demands on the functioning of individual national planning and management systems. A bilateral union makes it possible to resolve a number of these complex issues (planning, material and technical deliveries, financial and foreign currency relations, price formation, etc.), even if this sometimes occurs at the expense of exceptions and a need for constructing special measures.

If one leaves out the two joint ventures which at the present time are just in the organizational stage (by coincidence, both are enterprises with Czechoslovak participation--Mongolcechoslovakmetall and Haldex in Ostrava), the reamining six are fine examples of the inappropriateness of skeptical comments concerning the possibilities for their existence at the present time. On the other hand, the organization of a joint venture has to be preceded by thorough and comprehensive preparation, which in many instances necessitates time-consuming negotiations between the potential partners. If, however, there exists a truly strong interest by the partners in the activities of the proposed joint venture, then it is possible, after a bilateral agreement has been arrived at, to reach the desired resolution even under the complex systemic conditions of today.

Practical Experience

A joint enterprise of CEMA member countries may be understood as an organization jointly managed by the participants and occupying itself with economic activities in certain predetermined areas. The chosen areas dictate the necessary asset base, which is then formed from contributions from the joint venture participants, after which the joint venture has these assets entirely at its disposal and may negotiate in its own name as a legal entity. In contrast to targeted long-range capital investment agreements (the Soyuz pipeline, the combine for cellulose production in Ust-ilim, etc.) a joint venture establishes ongoing property-rights relationships among the interested parties, which are as a rule khozraschet organizations of CEMA member countries (economic production units [VHT], foreign-trade enterprises, and the like). The joint venture participants, therefore, have the right over the entire period of its existence to make joint decisions concerning its activities and to participate, in direct proportion to their respective shares in the joint venture, in its economic performance (profits as well as losses).

Experience indicates that a joint venture may become an ongoing source of the product in question (not only raw materials) for the participating sides. In

such instances, though, there need be no mutual distribution of the economic results, because the realized profits may be either aggregated in the market price of the final products or services, or may be allocated to an expansion of enterprise production. The chief area of applicability for joint ventures lies primarily where it is otherwise impossible to create a guarantee of the long-term use of the contributions of the participating parties. A rapid return on investment resources in the form of long-term targeted investment credits would mean, given this situation, a relatively short payback period for the resources provided, which would in turn lead to the untimely demise of the rights and demands of the participants.

A joint venture likewise creates the preconditions for increased effectiveness of the capital investment process, when compared with investments undertaken separately within the framework of individual national economies. This comes about because the investment resources in question may be allocated, in optimal amounts to the most appropriate localities in terms of the availability of raw materials, fuel, labor, etc. It is often also possible in this way to overcome existing limits on material and financial resources and achieve a greater agglomeration of resources and concentration of production.

For instance, the oldest joint enterprise, Katowice Haldex, is engaged in the extraction of quality bituminous coal and other valuable raw materials for the construction and ceramics industries from mined-out coal dumps which otherwise would detract from the environment in coalmining centers. A newly constructed joint enterprise, Ostrava Haldex, has a similar purpose. The Intransmas joint venture is concerned with the very pressing activities of the development, construction and delivery of systems for internal enterprise transportation and warehousing, which are also being applied in the CSSR. The Mongolian-Soviet Erdenet joint venture, which extracts and processes copper and other ore concentrates, currently is among the largest in the world and continues to develop. Also successful have been the operations of the first multilateral joint venture within the CEMA--Interlichter--which provides transportation of goods between docks on the Black, Mediterranean and South China seas and ports of call along the Danube.

The experiences of these joint ventures indicate that complex and multifaceted relationships and ties are formed among the immediate participants of a given cooperative effort, as well as between national khozraschet enterprises and the joint venture. It would, therefore, be a great mistake to regard a joint venture as a mechanical transformation of individual national enterprises. They represent rather a new element in international socialist production relations related to the integration of the forces of production.

Related to this as well is the great sifnificance of these enterprises for the gradual improvement of the overall mechanism of socialist economic integration. The sphere of their activity may become the foundation for more specific as well as more multilateral cooperation in planning in both a material sense and in terms of time. They can also contribute to the gradual simplification of the planning and management systems of national socialist economices (price formation, economic mechanisms, the operations of foreign-trade organizations, and the like).

Current developments in this area, moreover, unambiguously confirm the correctness of this orientation toward the development of direct relationships within the CEMA framework, with joint ventures being one of the vehicles for this. The use of underutilized potential is in this way linked with a number of as yet unresolved issues, an awareness of and the gradual resolution of which can very much accelerate the international socialist division of labor.

Pressing Questions

The development of joint ventures among CEMA member countries within the framework of direct relationships is directly tied to the gradual development of elements of joint planning and additional forms of planning cooperation between these countries. Current problems in this area are related to the fact that:

--current forms of cooperation in planning are oriented primarily toward outputs, while in join ventures the entire production process must be taken into consideration;

--there is not as yet sufficient material, temporal and methodological integration between joint planning and other forms of cooperation in planning and the planning process within the relevant national socialist economies;

--there is a painful lack of an adequately formulated and practically utilized technique for choosing projects and measuring the effectiveness of their implementation;

--in a number of cases, there has been insufficient knowledge at the beginning stages of the development of direct relations, of needs and resources, and the possiblities for covering these needs and making use of these resources at the level of khozraschet organizations.

To be sure, harmonizing the interests of the joint venture participants may in specific instances cover over these problems, but this requires further support from the viewpoint of the broader development of integration. As far as the CSSR is concerned, it may be responsibly stated that the applicable legal standards and regulations do not constitute a serious obstacle to the setting up and operation of joint ventures on our territory. In particular, one may cite the issuance of the law concerning economic contacts with foreign interests, No 42/1980, Laws of the CSSR, the amendment to the Economic Code, Section 389, the amendment of the Labor Code, etc. The organs which have jurisdiction over this also respect all approved model documents, even though their role is a facilitative one ("The Joint Resolution on the Establishment and Operation of International Economic Organizations," approved by the executive committee of the CEMA and others).

In this context and under our conditions, there exists a certain amount of underutilized potential in the area of the development of the khozraschet independence of enterprises and VHJ, which may be reflected in the overall approach of these facilities to joint ventures within the context of the CEMA.

At the same time, khozraschet principles are an important characteristic of a joint venture, because they create the preconditions for an optimal valuation of the actual member contributions. From this viewpoint, the principles of the extraterritoriality of a joint venture must be rejected because the assurance of a specific production process requires numerous and extensive ties with the economic organism of its host country.

This is connected as well to the assurance of a unified approach to the concept of efficiency and its introduction into the system of plan indicators at all necessary levels, as well as into material incentive mechanisms. Price formation plays a key role here, even though it is not a question of the mechanical merger of domestic and foreign prices, but rather of the flexible adaptability of domestic wholesale prices to the objective conditions of foreign markets.

A joint venture creates very favorable conditions for the joint analysis and comparison of internal costs and existing wholesale prices within the participating countries, an exercise which has great significance for the choice of the most effective variants of cooperation. At the level of both inputs and outputs, the level of contract, and therefore world prices, should be respected. A joint venture should be able to create the preconditions for the achievement of production costs which will be comparable to international norms.

In the interest of the rational functioning of khozraschet within the joint venture, there must be continuity in the valuing of its production inputs and outputs. At the same time, the sales price can become a channel for the allocation of the overall economic performance of the enterprise, as has already been shown by the examples of several existing joint ventures (Druzba Haldex, etc.) At the same time, it must be kept in mind that a final and definitive resolution of the price-formation issue cannot yet be provided, because this is an area that is in an ongoing state of development.

Close Ties

The existence of quite complex problems in the futher development of joint ventures between CEMA member countries cannot in and of itself be used as an alibi for rejecting them out of hand. It must be perceived that they can serve as a means for realizing needed economic advantages and for reducing national investment intensiveness, while simultaneously bringing about progressive structural changes within individual national economies. It is natural that this is a matter of a long-range process which is furthermore closely linked to other forms of integration--cooperation and specialization of production, scientific and technical cooperation, etc.

Last year's 36th CEMA session provided very valuable suggestions in this regard, in keeping with its emphasis on deepening the coordination of the overall economic policy of the CEMA member countries. From the viewpoint of further opportunities for joint ventures, it is mainly a question of the development of production facilities which do not as yet exist within the CEMA of which are functioning at an inadequate level either because they are technically and technologically unsophisticated or because they do not correspond to the necessity for locating facilities rationally in terms of the natural and economic conditions of the socialist community.

The participation of individual CEMA countries in joint ventures is, in accordance with fundamental CEMA documents, voluntary, which only confirms the importance of a national approach to this sphere. The consistency of these individual national approaches is, therefore, of great importance. The profile of national participation in international socialist integration under current conditions still lacks, in most member countries, a precise definition of national and international inputs in terms of technical-economic criteria. This sometimes causes in the case of joint ventures, a lack of the requisite orientation as early as the stage of preliminary requests. The resolution of this difficult problem, at the same time, can also contribute to a bringing into line of the material and value aspects of a given production process.

In connection with the implementation of long-term target cooperative programs and of other program documents adopted within the CEMA, one must count on the further development of joint ventures between interested CEMA member countries, despite existing problems and as yet unresolved questions. It is, however, essential to base our actions on the assumption that this cannot be a process that is an end in itself, but rather a conscientious attempt by all interested participants to meet pressing needs of individual national economies.

In firm conjunction with cooperation and production specialization, with scientific and technical cooperation and other progessive forms of economic integration, joint ventures have become a kind of point of intersection where long-term types of cooperative activities may effectively flow together to form the principal content of the international socialist division of labor within the CEMA.

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LONG-TERM PROGRAM FOR ECONOMIC COOPERATION WITH GREECE

Sofia DURZHAVEN VESTNIK in Bulgarian 10 May 83 pp 483-485

[Ministry of Foreign Affairs--Long-Term Program regarding Basic Principles for Further Development of Economic Cooperation between Bulgarian People's Republic and Republic of Greece, ratified by Ukase No 333 of State Council dated 3 February 1983, DURZHAVEN VESTNIK No 18 of 1983, with entry into force as of 26 June 1982]

[Text] The Bulgarian People's Republic and the Republic of Greece, guided by the desire to develop still friendlier and more good-neighborly relations in keeping with the long-term interests of both countries and of the peace in the Balkan region and in Europe,

And mindful that the present growth of trade and economic relations, as well as the existing forms of cooperation, only partially reflect the actual possibilities of both countries,

And guided by the desire to take advantage of the objective preconditions and opportunities resulting from the degree of development of the national economies of Bulgaria and Greece in order to achieve further dynamic growth and diversification of economic relations on a firm and long-term basis,

And appreciating the necessity of long-term treaties and programs in order to assure stable, balanced and long-term development on a reciprocally advantageous basis,

Have agreed to direct their respective state agencies, as well as their respective economic organizations and firms towards cooperation and joint activity within the framework of national legislation and the international obligations that each country has assumed, in the following areas indicated by way of illustration:

I. Trade and Banking Cooperation

1. Both countries have agreed that in trade and economic relations a more dynamic growth of commerce is possible, having as its objective a stable and balanced increase in the volume thereof and a diversification of the goods exchanged.

2. Both countries will enlarge the range of coverage of information data regarding the main lines of development in their national investment programs with a view to the implementation of joint projects of mutual interest. For this purpose the competent planning agencies will make contacts among themselves, taking into account the specific features of the national programs.

3. To facilitate industrial cooperation and reciprocal deliveries of equipment and appurtenances in jointly selected fields, both countries have agreed to establish enterprises to meet the needs on the basis of long-term contracts.

4. Both countries believe that the implementation of the above-indicated long-term contracts will promote the expansion of trade and will contribute in the future to finding appropriate means for the achievement of this goal.

5. It has been ascertained that the further expansion of trade and economic cooperation will be accomplished with greater success through the establishment of joint companies in the areas of production, trade, transportation and engineering activity for satisfying the needs not only of the Greek and Bulgarian markets, but also the markets of third countries.

To facilitate these forms of cooperation, both countries will require their competent agencies to investigate the possibilities and, in the event of mutual interest, to sign an intergovernmental agreement to encourage and guarantee investments and an agreement for the avoidance of double taxation.

6. Both countries have agreed to take action in the matter of cooperation in third markets in the following more important areas: joint planning and building of construction and industrial projects, and the same for the infrastructure in third countries; cooperation in the sale of Bulgarian and Greek goods in third markets.

7. In view of the specific conditions of the different international markets, both countries regard it as necessary to make joint studies of the markets in question. On the basis of these studies and provided there is mutual interest, they will develop joint production capacities within the framework of mixed companies for satisfying the requirements of the targeted markets.

8. For the development of bilateral cooperation, including cooperation in third markets, both countries have given special attention to questions of the extension of credit and will, within the framework of legislation in effect in both countries, make efforts to solve these in the best way possible.

9. Both countries have contracted to recommend to their banking institutions that they help interested enterprises and firms of both countries in their dealings with each other, as follows: by making available appropriate facilities which the above-mentioned banking institutions will negotiate mutually; by expansion of the correspondent network; by studying opportunities and, in the event of mutual interest, organizing mixed banking institutions, including those organized by attracting capital from third countries.

II. Industrial and Technical Cooperation

Taking into account the structure of the national economies of the two countries and the national programs of development, the degree of specialization attained in certain areas, and production methods, both countries have ascertained that there are favorable opportunities for the development of broad industrial, economic, technical and market cooperation and have agreed to encourage, on a mutually advantageous basis, specific projects for economic and technical cooperation between state and public organizations, cooperatives, organizations for the encouragement of exports, commercial and industrial pavilions and private firms in the following areas indicated by way of illustration:

1. Machine Building and Electronics

Cooperation in the following areas:

a) Construction of equipment for the production of metal-cutting machinery and sale thereof in third markets;

b) Production and sale of buses, minibuses, warehouse trucks, transportation equipment and systems;

c) Production and assembly of certain types of electric motors, transformers, low-voltage apparatus, communication equipment, industrial electronics, printed circuits, electric cash registers, electric taxi meters, systems for the control and distribution of water, power and other resources.

2. Cooperation in Chemical Industry

Cooperation in production and sale of: polyurethane lacquer coatings for the furniture industry; extruded rubber products; equipment made of synthetic materials for stadiums, concert halls, gymnasiums and other public buildings; synthetic materials for construction and electronics; medicines, cosmetics and perfumes.

3. Coopertion in Metallurgy and Mineral Resources

Geological explorations and drilling in search of ore and nonmetalliferous mineral deposits, cooperation in technology, extraction and processing of raw materials, intermediate products and semifinished goods.

Joint exploration, planning and working of bauxite, lead and zinc, copper, nickel, chrome and gold deposits and their processing into metal.

Exploration, planning and joint extraction and processing of nonmetalliferous mineral resources: magnesium, marble etc.

It has been agreed that payment for equipment and services provided can be made in the output of the developed projects.

4. Light Industry

Both countries have found that the relatively high degree of development achieved by light industry in Bulgaria and Greece creates favorable opportunities to organize the efficient and competitive joint production and sale of a number of modern products.

They have agreed to lend support and to encourage cooperation in the production of and trade in ready-to-wear clothing, knitwear, shoes, leather goods etc.

5. Agriculture and Food Industry

Both countries are mindful of the importance of agriculture and the food, wine and tobacco industry and believe that cooperation in these areas must be concentrated preferentially on the following sectors and activities:

Investigation, planning and delivery of equipment and construction of agroindustrial complexes including animal husbandry and poultry sections, industrial enterprises for processing agricultural output etc.;

Investigation, planning and delivery of equipment and construction of silos, cold storage plants and appurtenances, feed plants, hothouses (all kinds), dairy enterprises etc.;

Investigation, planning and construction of amelioration projects, reservoirs, irrigation fields, drainage systems, biological treatment plants etc.;

Joint finishing of livestock, meat and milk production, and the manufacture of dairy products with a high degree of processing into delicacies and specialties;

Long-term cooperation in the processing of vegetables and fruits (including citrus) and the production of canned goods, concentrates, juices and other products;

Joint wine making, bottling and trading;

Joint production, processing and trading in tobaccos and tobacco products, development and sale of a Bulgarian-Greek cigarette;

Cooperation in processing and trading in industrial raw materials of agricultural origin: cotton, hides etc.

6. Power Supply

Both countries have ascertained with satisfaction that the first stage of the power line link between the power systems of the Bulgarian People's Republic and the Republic of Greece has been successfully completed and have charged their competent agencies with making preliminary studies so that during the session of the Mixed Intergovernmental Bulgarian-Greek Commission on Economic and Scientific-and-Technical Cooperation in Sofia (12-16 July 1982) they may spell out the questions of the second stage of the link and the linking of a

220-megavolt power block of the electrical system (Bobov Dol) with the Greek network in order to supply Greece with the necessary electric power during the transition period.

In conformity with the decision of the Eighth Session of the Mixed Intergovernmental Bulgarian-Greek Commission on Economic and Scientific-and-Technical Cooperation a mixed task force will study the existing possibilities for the expansion of cooperation in power engineering, with priority in areas to be determined by the coincidence of both countries' mutual interests.

The following areas are indicated by way of illustration:

1) Geological explorations for energy resources.

2) Study, planning and construction of hydraulic projects and hydroelectric power plants.

3) Planning and construction of systems for the transfer, transformation and distribution of electric power.

4) Study, planning and construction of new power capacities for the utilization of new energy sources.

5) Maintenance and repair of power facilities; use of existing--and building of new--means for the transfer of power and raw materials.

6) Modernization, reconstruction and automation of power plants and systems.

7) Study, planning and building of coal-mining projects.

8) Study, planning and building of thermoelectric power plants.

7. Transportation

Both countries believe that the further development of economic cooperation and trade between them will disclose favorable prospects for expansion in transportation.

For this purpose they will encourage all forms of cooperation within the framework of existing trends and on a mutually advantageous basis.

They recommend that their competent ministries and organizations continue investigation of the advisability and possibilities of further development of the existing rail, air and highway connections and border check points between the two countries, as well as the creation of new transportation connections.

Both countries will encourage contacts between their competent state organizations and firms for the discovery of new possibilities and, in the event of mutual interest, contracts are to be signed for the joint planning and construction in the Bulgarian People's Republic, the Republic of Greece and in third countries, of the following projects: signaling systems of railroad lines;

reconstruction, modernization and electrification of rail lines; reconstruction and modernization of harbors; planning and building of road projects; building of the infrastructure of construction projects.

8. Communications

Both countries have ascertained with satisfaction that relations between the Bulgarian People's Republic and the Republic of Greece have progressed actively in the field of communications during recent years. Close contacts are maintained between their respective organizations during the development and completion of postal and telecommunication links

In order to expand cooperation in this area it is recommended that the competent agencies of the two countries concentrate their efforts in the following directions: expansion of telex communications; automation of telephone communications and advance planning of trunk groups for terminal and transit traffic of both countries; cooperation in telecommunications and in servicing traffic from Western and Central Europe for countries of the Near East and Northern Africa.

III. Scientific and Technical Cooperation

Both countries have taken note that the Mixed Intergovernmental Bulgarian-Greek Commission for Economic and Scientific-and-Technical Cooperation has achieved significant results.

It has been noted that there is a need to discuss the possibilities for an expansion of the forms of cooperation, as well as in new fields such as programming and planning, medical research etc. Both countries will study the possibilities of granting scholarships on a reciprocal basis for long-term specialized training of scientists and specialists in various fields.

IV. Tourism

For the purpose of developing cooperation in tourism, both countries have agreed:

To require that their competent agencies develop joint measures aimed at the further expansion of tourist travel between the two countries and at investigation of the possibilities of cooperation in the planning, financing and construction of tourist facilities;

To investigate, through their competent agencies, and to employ the best-suited forms of advertising the tourist possibilities of Bulgaria and Greece, as well as organizing combined tours with a view to attracting tourists from third countries. Interested state organizations and companies of both countries are to clarify the necessity of establishing a mixed company for this purpose.

Both countries emphasize the great importance of the plans for cooperation contained in this Long-Term Program and will assure the most favorable conditions for their implementation on the basis of existing legislation in the two countries.

They will encourage the carrying out of initiatives aimed at a better familiarization with the opportunities of the two countries and at the development of economic cooperation, more especially through the organization of fairs, exhibitions, specialized rooms, symposiums, technical days etc.

As opportunities are discovered, by mutual agreement between the countries this Long-Term Program can be amplified by the inclusion of new projects and new areas of cooperation.

Both countries entrust the Mixed Intergovernmental Bulgarian-Greek Commission on Economic and Scientific-and-Technical Cooperation with organizing and coordinating the implementation of this program. During its next session (12-16 July 1982) the commission is to prepare a program of future activity in order to facilitate direct contacts at different levels with the object of reaching agreements between the competent agencies of the two countries and the signing of specific contracts between economic organizations and firms.

This Long-Term Program has been entered into for a period of 5 years. It shall take effect provisionally from the day of its signature and definitively from the day of its publication after ratification by the competent bodies of the two countries. On the expiration of this period it shall automatically continue for each succeeding year unless denounced by one of the parties with 6 months' advance notice.

Done at Varna on 26 June 1982 in two original copies in the Bulgarian and Greek languages, both texts being equally valid.

For the Bulgarian People's Republic:

T. Zhivkov

For the Republic of Greece:

G. Papandreou

6474
CSO: 2200/87

ZDOBINA REJECTS REFORM, ARGUES FOR KHOZRASCHET IMPLEMENTATION

Bratislava PRAVDA in Slovak 15 Mar 83 p 3

[Article by Frantisek Zdobina: "A Powerful Takeoff Run But a Short Flight"]

[Text] It is no secret that in some places there are fewer people working than there should be, that some people meet their norms in 5 or 6 hours and then walk around with their hands in their pockets, and that our streets are so busy all day because it is very easy for many people to put a "Back soon" sign on their office desk, while extending that "soon" into dozens of minutes spent wandering through the shops.

There is no method of calculating what we have lost and are still losing in this way, but there is no doubt that it is a huge amount. Let us first consider some suggested ways of preventing this dispersion or loss of working time.

--It is frequently held that it would be helpful to increase the authority of the foremen. Every suggestion should be studied attentively, but authority is not acquired by decree, and even if the foremen's words meant more than they have so far, this would not be a complete solution.

--In some "circles" it is popular to assert that "if people were properly paid, they would work more." Wages should be in accordance with performance, but who is so bold as to state that if more wages were given to the slipshod worker, the loafer or the absentee, they would change into pacesetters?

--We also hear it said that it would help to arrange for a low level of unemployment: many would then value work more. Experience in this area was obtained in the pre-Munich republic, and we have knowledge of conditions in the West, where the number of unemployed is growing by the millions, where people conceal illness to prevent being fired, and sometimes, as in Japan, give up part of their vacations. But this suggestion is also unacceptable. According to our constitution, the right to work is the right of every citizen; in this way the constitution embodies one of the most important achievements of socialism. This is not only a social and political matter, but an economic matter as well. The planned economy has the best potential for using all of society's productive forces; why, therefore, should we move backward and condemn people, the main productive capacity, to unemployment?

Sensitive, But Not to Be Avoided

We could continue our survey of such suggestions, but it is unnecesary. Experience enables us to state that sporadic, unconnected measures will not do. The problem, which has troubled us for years, requires a fundamental solution in keeping with life in socialist society.

But what fundamental solution?

There could be several answers to this question, for the question of utilization of manpower and everything associated with it, labor value added, is extremely important. More than that, it is considered politically and socially sensitive. In general, the idea that this circumstance is "extraordinarily sensitive" is correct, but the discussion is often pushed to an incorrect extreme: the sensitivity of the topic supposedly requires that we avoid possible conflicts and disagreements. And what happens then? In a wage conflict, for example, a slipshod worker puts on the boxing gloves and the functionaries or economic personnel who have summoned him take a defensive posture; for this slipshod worker may threaten a complaint to the plant ROH [Revolutionary Trade Union Movement] committee, or may go on the attack by declaring that we are all equal and there is no reason for one person to have more and another person less.

We are not abandoning persuasion, but there are people who scoff at goodwill and misuse kindness. They must be instructed as to their duty, or--let us not be afraid of the word--compelled to do it.

A Precise Orientation

Problems related to the amount of labor consumed per unit output and ways of replacing it have worsened particularly in connection with the economic experiments and the introuction of the Set of Measures for Improving Planned Management of the National Economy. What at first could be ignored forces itself on our attention. Only 46.6 percent of the workers in the main federally managed production sectors had worked in accordance with the labor consumption norms by the end of the last decade. Certain norms had been upheld by one one-third of the workers subject to labor-consumption norms. The nationwide average agrees almost precisely with the situation in the SSR and CSR.

We had to improve management, and the norms, one of the main tools of management, were low and of poor quality.

Accordingly, in Decree No 382/1980, the CSSR Government announced the Program for Increasing the Economic Effectiveness of Wages in the First Years of the Seventh 5-Year Plan, as well as procedures to improve the quality of the labor-consumption norms and expand them. Each follows from the other and is a prerequisite for the other.

The government decree was conceived "primarily to support an orientation toward intensive methods of development." We stress this to bring out the

fact that the program for rationalizing labor inputs is an inseparable component of the new upcoming economic undertakings, one of a set of interconnected fronts of which the struggle to achieve the strategic objectives mapped out by the 16th CPCZ Congress is proceeding.

The program required most ministries to do the following in 1981-1983:

--to review all labor consumption norms in use and to bring them into agreement with actual technical conditions;

--to expand the set of labor-consumption norms so that the number of workers not subject to norms would decrease by at least 15 percnet, and in subsequent years by 10 percent annually.

These were and continue to be essential measures, and if we were to add to them, it would only be that they would have helped the rationalization of labor if they had come sooner. We had the conditions for it. We could have drawn on our experience, particularly from the 1950's. Theoretically, the subjects in question are clear. In 1919, in a report on subbotniks [volunteer labor during time off], V.I. Lenin wrote some things which sound relevant today: "Socialism presupposes...social labor with extremely precise documentation, monitoring and supervision by the organized vanguard, the most mature component of the workers, in addition to establishment of measures of labor and compensation for it."

Lenin devoted particular attention to rationalization and was, for example, fully conversant with the Taylor system; he rejected its exploitative character but valued its scientific basis of measuring labor expended.

What are the lessons from this? One is that our populace should know more about the way capitalist corporations are run. Many believe that people in them can work as they wish, that they are simply masters of their time as employees. A doctor who had returned from a 2-year tour of duty in a well-known Western clinic helped dispel this illusion. No sooner had he taken off his coat in the maternity hospital than he was surrounded by doctors and nurses who wanted him to talk. He talked, and after 2 hours he looked at his watch, stopped in mid-sentence, and said: "All of you who have been here for 2 hours would have been fired by the chief resident there for failure to carry out your duties."

One sentence, but it had the effect of a cold shower.

Another lesson is that economic propaganda and agitation should deal much more actively with questions of labor rationalization than it has. In addition to praise where it is merited (for example, forms of cooperation between standard-setters, workers and technical personnel, instances of the creation of new job types and elimination of old ones, examples of the use of technology and organization to change working conditions), it should specifically criticize negative phenomena, photograph a line of people waiting at peak hours, while nobody is there to serve them, an abandoned machine at which a lathe operator should be standing, and the like, So far we have been dealing in praise more than in criticism, with unfortunate results.

A Good Decree, but Delayed Implementation

Considerable time elapsed after the adoption of Government Decree No 382 before there began to be progress in rationalizing labor and strengthening the economic function of wages. It should have shown its effects primarily:

--in increased labor productivity (even though this is affected by many factors);

--in strengthened work and technical disipline and better use of working time;

--by underscoring the authority of wages and wage forms.

Even though mobilizing reserves in the labor value added area may give quick results, we are finding that the growth of labor productivity has recently been slowing. In 1981 it showed a drop, while last year labor productivity in industry increased half a percent in terms of gross output, while labor productivity in construction dropped 2.9 percent. It was thought that 1 percent of the increase in labor productivity in industry and construction would result from labor rationalization measures.

Utilization of worktime stands at 91.5 percent, just as in the preceding year: there has been no progress.

Wages have increase by Kcs 82 in industry, while in construction the average wage is a few halers less than Kcs 3,000!

Although these data should, in the interest of completeness, be given in a wider context (for example, labor productivity is affected by many factors), it is apparent even at first glance that these are not exactly the most favorable kinds of figures. In other words, the slowing of the rate of growth of output is manifesting itself in a slowing of the rate of growth of labor productivity, but not in a saving of manpower and labor. Even if such savings had occurred, they would have resulted primarily from another cause, i.e., "insufficient manpower."

Thus the objectivization and review of norms did not proceed as the government has prescribed, and the economic function of wages has still not evolved to the specified breadth and depth.

Let us give some more specific instances.

When the government adopted its decree, at the Bratislavske electrotechnicke zavody k. p. [Bratislava Electrotechnical Works Concern] in Bratislava the average fulfillment of output norms was 123.9 percent, while in November 1982 it had increased to 131.5 percent. Does someone assert that an overfulfillment of norms is possible where norms are scientifically based? At ETZ [Electrotechnical Works] Bystrany, fulfillment of the norms was similarly 129.2 percent at the end of 1980, while 2 years later it was 135.2 percent; at Sigma Lutin the figures were 126 percent and 133 percent.

More proof hardly seems to be needed. Labor and labor consumption are not measured accurately anywhere. The SST Ministry of Labor and Social Affairs confirms that "in the SSR a considerable range of activities are not covered by labor-consumption norms, or, while the norms exist, they are not enforced."

And what about wages? Differences in earnings are considerably less than differences in results, because (the conclusion is the same) in many cases there is no monitoring of the amount and quality of labor. Increasing of wages is also helped by the so-called "social view," for example, "let's give it to him, he's building a house, he's paying alimony, his family is growing, he wants to buy a car," and so on.

People who take this approach or who urge the social viewpoint where it is not appropriate most often believe that somehow that koruna gets lost in the complex workings of the economy and the financial plans.

Nothing gets lost! Losses are totaled up, and today we see that a single minute of unused working time throughout industry is equivalent to the value of Kcs 6 million.

Everything affects everyone, whether it is at the other end of the republic or in the next workshop. If wages are higher than performance, they do not provide a stimulus to increase output. Worker morale drops, output does not correspond to capabilities and fewer products go on the market. The market reacts further. It is not capable of realizing income, because money not matched by labor comes into circulation. The first to criticize is the citizen who has obtained more money without corresponding performance. The honest purchaser is also out of temper: he rightly does not measure his well-being in terms of an increased rate of material consumption (which often is not implied, because it has different forms at different times), but in terms of how easy or difficult it is for him to get the desired goods or services with his earnings.

Thus we criticize commerce and production for what is their responsibility, but we should sometimes ask our own consciences whether we are helping to obey one of the basic laws of socialism, the law of distribution according to work, and whether we consider wages as the main form in which it manifests itself.

Voluntarism Is not Enough

It is estimated that CSSR Government Decree No 382 is being implemented about half a year later than the specificed schedule. Apparently nobody is to blame. The instructions came down in time, the ministries gave out their instructions, activities and briefings were held at all management levels. In order to intensify the economic function of wages, it has been decided, among other things, that a limit on wage commitments should be the only compulsory indicator in the labor and wage plan.

Everything changed for the better: norms that nobody had thought about for years were reviewed, but the fulfillment of Decree No 382 was supposed to involve much more.

This is explained in a variety of ways: that the teams that set the labor norms were undermanned or underqualified, that the organizational structures were not uniform, that there is a prevailing fear of conflict situations, a universal unwillingness to discover unused potential, and the like.

Additional measures have been prepared to correct the situation. An intersectorial commission is being formed to organize the creation and introduction of individual norms and standards, new instructions and warnings are being sent down, and so on. One should not curse what has not yet begun to function, but certainly we do nobody wrong if we state that what has been reported in party documents on the subject is still valid, namely that the entire existing system of labor rationalization is based primarily on voluntary initiative and activitism: it has not become a tool of management within the enterprise, it has not yet led to a search for and mobilization of resources and potential for conservation of labor.

Rationalization, and especially labor rationalization, is not and cannot be based only on voluntarism. Every initiative, and especially displays of voluntarism, as for example in the early 1950's, when a movement for objectivization of the norms and discovery of latent potential developed in the enterprises, should be given thanks and welcomed. But, rationalization of labor, which is a part of the broader intensification effort, and "which involves particularly improved division of, cooperation in, and structuring of labor, improvement of labor organization and methods, improvement of working conditions and environments, further improvement," is not a matter of voluntarism, but of necessity. Voluntarism can only support it and come to meet it halfway.

Unfortunately, the principle of necessity was not explained and consistently implemented.

What, then, can we expect? New instructions and orders? The enterprises are now vehemently calling for more help from above. This is traditional in this country. But if we take account of all that the center has done, we realize that the greater debt now rests with the VHJ's and enterprises. The question of why the enterprises and VHJ's have recently neglected objectivization and expansion of norms and have ignored the economic function or wages merits further consideration. But it is most important at present to ask ourselves where we can find a stimulus which would act constantly for rationalization and help cleanse wages of everything that has adhered to them over time.

This question may appear rhetorical, for the answer to it is not known. It suggests the statement which is underlined in every solid textbook of political economy: "There is no relation or process in economic life of which we can say that it expresses the isolated action of only one single economic law."

In other words, there is no process which can be arranged without reference to another.

In relation to the present subject, we quote the eminent Soviet economist Leonid Abalkin: "The main area of work with the enterprises is activation of economic methods of management and decisive strengthening of khozraschet."

And Comrade Jozef Lenart said in a recent conversation with editors in chief about our problems: It is necessary "to decrease the consumption of both past labor inputs and value added per unit of utility, which have all the more become constantly acting factors," And in connection with improvement of consumption and output norms, we must "introduce khozraschet more aggressively."

Rudolf Netik, a department head of the CPSL [Slovak Communist Party] Central Committee says: "Without reinforcing khozraschet it is impossible...to increase the economic collectives' stake in improving the ultimate results of production."

These three quotes merit more thorough consideration. They contain the answer to our question as to why we have so neglected the process of review, objectivization and expansion of norms and the economic function of wages, why CSSR Government Decree No 382 is not being carried out consistently and in timely fashion; but primarily they contain a summons to more rapid introduction of khozraschet and utilization of its advantages. Khozraschet enables us to solve the problems we were discussing in connection with others which condition each other; it has an integrating function, and is capable of assuring satisfaction of enterprise, collective and personnel needs in accordance with the results they have already obtained and their contributions to the national economy.

Unfortunately, khozraschet does not have a firm position in many enterprises and some VHJ's, and in some places it has actually not yet been introduced. These organizations have probably forgotten the economic wisdom that "the only route to plenty is saving of time and improvement of labor productivity."

8480
CSO: 2400/189

'EXPERIMENT' IN FOREIGN-TRADE CONDUCT DISCUSSED

Prague HOSPODARSKE NOVINY in Czech 8 Apr 83 p 6

[Article by Eng Dusan Hrncirik, economic manager, Chirana Syndicate, Stara Tura: "Chirana Is Experimenting--Change in the Management of Foreign Trade"]

> [Text] Foreign trade is one of the main factors which determine the prosperity of Czechoslovak economy. It is therefore understandable that our central authorities, VHJ [economic production units] and organizations of foreign trade are seeking ways to improve the efficiency of foreign-trade exchange and in particular, the efficiency of exports, on the basis of objective as well as systematic policies because experience has shown that management represents precisely one of the decisive assets which, if full utilized, may bring considerable societywide benefits.

That is the objective of new policies for improving the efficiency of economic relations which will be experimentally tested in selected VHJ and foreign-trade organizations in the last 3 years of the 5-year plan. Published regulations for the experiment in this area have further intensified the Set of Measures.

The Chirana Syndicate in Stara Tura is one of the VHJ selected for the experiment. One of the reasons for that decision is the fact that for more than a decade the production and foreign trade of this VHJ have been interrelated in terms of organization and economy on the basis of an authorization granted by the Federal Ministry of Foreign Trade. Thus far the authorization included the possibility of directly exporting products of medical technology manufactures by Chirana or by other VHJ. As of 1 January 1983, this program was further expanded in the same sector by direct imports transferred from the Kovo foreign trade enterprise on the basis of delimitation.

When some time ago Chirana applied for the authorization to conduct foreign trade, its objective was primarily higher export efficiency. The devices to reach that objective are mutually interrelated economic incentives based on the principle of merit of individuals and teams.

The same principle also provided the source for policies concerning experimental testing of the new measures for improving foreign economic

relations. The regulations distinguish two types of interrelation of production and foreign trade. One, which will be tested in Chirana, is an organizational and economic interrelation whereby the organization of foreign trade will be integrated in the VHJ as a trust or syndicate, or as a unit of the general directorate. In that case the general director is responsible, in addition to his subordination to the sectorial ministry, to the minister of foreign trade for the observation of the principles of state monopoly of foreign trade, the objectives stipulated by the Federal Ministry of Foreign Trade, for example, in the area of price policy, contracts and conduct of foreign-trade transactions and other regulations issued for this area. It is self-evident that a part of organizational interrelations also involves economic interrelations which proceed from the principles of VHJ khozraschet i.e., economic achievements in the transactions of foreign trade are a part of total results of the VHJ.

The Significance of the New Policy

A question may arise about the nature of this experiment, since the production and foreign trade in this VHJ have already been combined for more than two 5-year plans. What is in essence the purpose of the new policy?

The changes are distinctly qualitative. While in relation to the socialist state the indicators of the plan and the degree of their linkage remain unchanged, the mandatory indicator coming to the fore in our relations toward the nonsocialist countries is foreign-exchange collection in commercial parity (including interest on long-term credits) after deducting planned direct costs of foreign trade. The emphasis on the importance of this indicator is closely connected with the need to achieve a balance of payments which in the final analysis is decisive for national economy.

Thus, our objective is to link the economy of the syndicate and its individual enterprises with state economy in an appropriate fashion, which means that the financial situation, the creation of funds, foreign exchange and wages payable including individual incomes, do not depend solely on the question of whether the goods are exported, but mainly on the question of whether, when and to what extent the syndicate and the enterprises receive payments for their goods. Naturally, that calls for far greater concern about the conditions of trade agreements, their credit requirements, the selection of partners, enforcement of claims, etc. Such problems are certain to diminish if we offer goods of high technological standards and quality, without the need to make concessions in prices of in terms of payment.

Mandatory indicators have been expanded by exports in prices quoted as "all charges paid" at the CSSR border and by the differential indicator, or as the case may be, foreign-exchange valuation of the costs of exported products. Among the indicators for orientation are exports in prices quoted as "all charges paid" at the CSSR border, in wholesale prices and in trade parity, and also a change of export claims abroad.

Pressing for Fulfillment

A relevant change is based on the fact that the crossing of the CSSR border is regarded as the place (moment) of the fulfillment of export tasks in both territories. Thus, in effect, the "delivery for export indicator" become the "export" indicator, and there is no possibility of fulfilling the task by loading [the goods] in a wagon or delivering them in the storage of foreign-trade organizations. As compared with the past years or with the VHJ which are not engaged in the experiment, this change strongly reinforces the assigned tasks, especially as concerns deliveries made toward the end of the planning period. Deliveries are not considered as fulfilled until they cross the border, which means more pressure for regular fulfillment in production and sales if we wish to avoid suffering the consequences of possible rush work to produce supplies for the market. Despite the ensuing problems, the decision is logical and correct because it removes unfair differences in accounting and, moreover, this method far better reflects the viewpoints of the national economy in assessing the fulfillment of export tasks. That is not all. It brings all partners closer and whets their interest in the fulfillment of their tasks.

As a matter of fact, in our recommendations to the proposals for intensification of the Set of Measures we were already seeking another change which has now been introduced in planning and accounting of national economic results.

According to the regulations of the experiment, economic results (profits or losses) derived from wholesale prices and from foreign trade (exports or imports) are combined in the balance of profits for the purpose of determination of the relations to the state budget and for the purpose of allocations. Wholesale prices will be further applied for assessment of exported goods in indicators of receipts, outputs and adjusted value added. However, in conjunction with the attitude of the superior branch, during 1983 we intend to study an alternative method for assessment of exported products in current purchase prices valid as of 1 January 1984. Naturally, this calls for adjustments of the methodology of the plan, accounting and statistics.

Despite all ensuing complications, I regard this alternative as an important and vital step toward greater commitment to the efficiency not only of exports but of the whole process of reproduction. Obviously, this means that this regulation must not remain on the top, on the level of management of the VHJ or its enterprises, but must be followed to the moment where the level of the future export prices is decided several years in advance--in other words, to scientific-technological development.

The fact is that the creation of price limits and, consequently, also of wholesale prices is today determined primarily by the level of wholesale prices and not according to attainable foreign prices, and thus it will be a very difficult and ineffective effort to convince interested personnel that the profits for the enterprise and society materialize only from the price paid for our goods by foreign customers. That also must be the decisive

criterion of the efficiency of the management and quality of work in the preproduction stages, no matter whether preferential pricing applies to the product according to the certificate of first quality or technological progress.

Discussions about the standard of the differential indicator will become redundant, not to mention the disputes between production and foreign trade about wholesale prices of new products.

Consistent Economic Incentives

The changes in the management of foreign-trade operations concern mainly economic stimulation of teams and individuals. They follow the new concept of applying certain indicators as stated above. In this conjunction their linkage to accumulation of funds at the disposal of the syndicate and the enterprises will be accentuated, among them also foreign exchange for imports, which will depend on the fulfillment of the plan for collection of foreign exchange. From that amount, the bank will calculate the share stipulated by the plan for imports and add it to a special account of the syndicate. This account will be debited for fulfilled imports and the unused balance will be transferred to the following year.

If the plan of foreign-exchange collection falls short of its fulfillment, the imports of the syndicate will be reduced by the absolute amount of the uncollected claims; with the exception of justified cases, the claim will be reduced in the following year by the excess, if any, over the claim adjusted in this manner. Credits in Czechoslovak currency derived from the interest earned on the balance of the special account are reflected in wages payable of the syndicate in accordance with the stipulated method.

Combined profits (from wholesale prices and foreign trade) constitute the basis for taxation in the sense of pertinent stipulations on financial management for the VHJ and enterprises according to Ordinance No 61/1980 of the Collection of Laws issued by the CSSR Government. Disposable profits are then the source of allocations to the funds of economic incentives which, in addition, depend on the fulfillment of export indicators, such as the volume, the differential indicator and collection of foreign exchange for nonsocialist states.

Wages payable seem to be probably the most sensitive area on which the experiment focuses. Here we are switching to the single-channel method of their accumulation by means of the adjusted value added indicator, corrected by a part of the difference (its extent will be determined by superior authorities) between the planned and actual foreign-exchange collection for exports to nonsocialist states and furthermore, by the amount corresponding to 50 percent of preferential prices paid for technically advanced goods and first-quality products and 4 percent of the receipts in basic wholesale nonpreferential prices for products included by control in the first-quality category, or 50 percent of price reductions as penalty for technically outdated products and third-quality goods. The method of adjustment of the decisive indicator is based, among other things, on the fact that price incentives (preferential pricing and penal price reduction on all titles) no longer apply for exported products.

As compared with the method applied thus far, several changes have been made here. In terms of incentives to promote export, sales categories cease to be merely an indicator determining potential application of relative conversion in case of overfulfillment of the plan of adjusted value added. Instead, for example, collections for exports to nonsocialist states have become in essence a part of the determining indicator and, thus, the failure to fulfill it may not only prevent potential conversion of wages payable in case of overfulfillment of adjusted value added, but also reduce its accumulation. Of course, overfulfillment of the collection plan may lead, on the other hand, to higher accumulation of wages payable both during the creation of the plan at a 1:1 ratio and to a lesser extent, during its implementation with the application of the reducing coefficient determined by superior authorities.

Naturally, a closer linkage of wage control with the fulfillment of export tasks must also be reflected in personal economic incentives, not only indirectly, in the form of disposable funds in the basic and flexible component of workers wages, but primarily directly, in appropriate wage forms. It seems necessary to expand the ranks of employees interested in the fulfillment of export tasks so that they are not confined to employees of trade sectors alone.

The fulfillment of this objective is a complex task especially for workers in the preproduction states which affect to a major degree the acceptance or nonacceptance of goods in sophisticated foreign markets. The problem stems from the lapse of time between the development of new products and their actual production. It may be difficult to apply the global indicator of export or collection to encourage the interest of the researchers and developers. Therefore, when launching a development program, we stipulate such parameters for new products that meet the requirements of demanding markets. The achievement of those parameters must guarantee marketability which is also the target of economic incentives.

Specific Responsibility

New policies for improving the efficiency of foreign economic relations will surely miss their target if they are not consistently focused on the center of the syndicate and its organizational units, on the organizational system and economic regulations. We have a certain advantage because in our syndicate the organizational groundwork has already been done. Export and import transactions are conducted by the foreign-trade sector of the syndicate, which is an independent economic center of the general directorate. The foreign-trade sector is managed according to the principle of enterprise subdivision khozrashchet. It has an independent accounting department where the accounts from the transactions in foreign trade and claims and obligations of the syndicate are kept independent of domestic transactions. In charge of those operations is the Czechoslovak Bank of Trade, a financial institute with a branch in Bratislava.

The director of the foreign-trade sector, who is one of the manager-specialists of the syndicate, was appointed to the office of general director and is responsible to the minister of foreign trade. He attends regular sessions of

the collegium of general directors, the council of directors and consultations for directors of the enterprise where information is directly exchanged and coordinated with top management executives. The director of the foreign-trade sector is responsible for the objectives of foreign trade and price policies stipulated by the Federal Ministry of Foreign Trade, and for observation of procedures set by that ministry for contracting and conducting foreign-trade transactions. Furthermore, he is accountable for the fulfillment of foreign-trade policies of the syndicate in accordance with approved concepts; he is personally responsible for the marketability of our products in foreign markets, for the fulfillment of orders, for attention to foreign claims and for the fulfillment of essential tasks of the state plan, in particular material exports, collections and foreign-exchange plans.

When we are prepaing specifications of statewide regulations for the experiment, we are especially concerned about maintaining as much as possible the linkage and interrelations of economic incentives for the syndicate as a whole with the incentives for the manufacturing enterprises, in order to prevent any disproportions in assets accumulated in different ways or even by mutually contradictory methods. This demand is closely connected in particular with reducing foreign claims to the lowest possible levels.

The complexity of this issue stems from the fact that numerous partners in the syndicate frequently participate in individual commercial transactions and furthermore, from potential influence of manufacturing enterprises on payability of foreign claims. Although it is undeniable that their collection if affected by the technical standard and quality of products, the fulfillment of delivery terms, availability of service, the supply of spare parts, etc., nevertheless, I believe that the foreign-trade sector has the decisive word in this respect because it chooses its foreign partners and is responsible for his integrity and for the whole procedure involving the transfer of foreign-exchange funds.

In view of that fact and of the limited time for specification and introduction of the new policies valid as of 1 January 1983, we put forth a method according to which collections of foreign exchange from nonsocialist states will be reflected in the financial situation of the syndicate, up to the level of the foreign-trade sector; at the same time, the manufacturing enterprises will be involved in such collections by means of export indicators in prices quoted as all charges paid, corrected by claims uncollected for reasons caused by the enterprises, for instance, inferior quality, incomplete delivery and so on. In spite of that, we adopted a task to test and assess potential intensifaction of the effect of foreign-exchange collections on the economy of individual enterprises during 1983, with the proviso that additional measures based on its results be adopted as of 1 January 1984.

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Some risk is involved in every experiment. In our case, for instance, certain risks emerge from the far more serious effect of several indicators on economic incentives. Some indicators will have to be thought through and definitely resolved.

It seems, however, that the greatest risk stems from the situation in the fulfillment of exports to nonsocialist countries. General crises in those countries and the stepped-up discriminatory policies against socialist states have raised the demands of the plan precisely at the moment when we shall be conducting experimental tests of our new policies. For that reason, they must be accompanied by a whole series of objective measures in technological development, in the production and commercial area in order to meet the demanding tasks of the plan. That is the only way that will enable us in the future to make a positive assessment of the effect produced by the new policy.

9004
CSO: 2400/256

DISCUSSION ON MEASURING WORTH OF ENTERPRISE CONTINUES

Prague HOSPODARSKE NOVINY in Czech 1 Apr 83 p 5

[Article by Doc Milos Cermak, CSc.: "How to Measure the Worth of an Enterprise? The Key Question Is the Price"]

[Text] Compared to the existing practice, the topics in the article "We Know the Objective, We Are Looking for Criteria" are no doubt advanced. However, I fear that they will not be able to bring about a fundamental change to intensification of our economy by themselves.

Discussion

A transition from an extensive to an intensive development is a very complex process which is becoming ever more topical. The basic weakness in the current approach lies in the oversimplification and superficiality in answering the decisive questions. The complexity and the standardized approach to planned management is generally recognized but its deeper understanding is not that simple. A solution is being sought in incomplete questions and also in symptomatic forms without a deeper analysis of its economic basis and mutual interactions.

As shown by our long-term experiences with inventories, for instance, it is impossible to achieve a positive reversal by applying only an administrative or a partial economic solution. Such solutions have led to a limited reduction in production inventories but have not prevented their disproportionate growth because the measures taken in a given period were only directed at the effects without solving any of the causes.

To improve the economic mechanism means, above all, to reconcile the economic interests of the socialist producers with the interests of the society. The conflicts of interest have, in the present stage of socialism, an objective material basis which a moral incentive alone cannot solve. The moral motivation is ineffective if the economic incentives promote the enterprise interests at a detriment to the society. If, however, the economic incentives influence the enterprise to act in consonance with the interests of society, then the moral incentive multiplies these effects.

It is not by accident that in improving their economic mechanism, all socialist countries stress that "what is good for the society has to be good for the individual enterprise." This principle applies not only to the entire economic mechanism, i.e., its principal economic elements, such as planning, khozraschet [cost accounting], and organizational structure, but also to all the other elements which make the economy work, such as forces of a political, social and legal character. And therein we need to look for the basis of a comprehensive approach toward improving the economic tools which is, of course, a complicated problem.

The present stage of transition from extensive to intensive development of the economy demands substantially new approaches to problems of economic mechanism as a whole, but above all, of its decisive economic elements. Therein I see the contribution of Doc Vladimir Kyzlink's article which within the framework of planned management, tries to analyze the possibility of a more effective utilization of the money-to-market relations and the law of value.

As to the plan problematic, the argument of Doc Vladimir Kyzlink that: "In a socialistic economy, the only criterian for measuring the contribution of an organization to the task of increasing quality and efficiency must be plan fulfillment," seems to me to be too categorical. It is also inconsistent with his views of the economic mechanism when, for instance, he claims that: "The basic indicator through which the central authorities would influence the activity of the organizations would have to be profit."

It is true that even today we meet with the prejudiced opinions of some officials of the central sphere who consider efficiency and plan to be the same. The question arises, what happens when the plan, as the result of our subjective activity, is wrong as, for instance, was the case with the unrealistic Third 5-Year Plan? A federal plan is undisputably the basic instrument for the management of a socialist economy. Only such a plan can ensure the effectiveness of the national economic structure.

However, planning is a subjective activity which is dependent on a number of factors, also of a subjective character and, therefore, mistakes cannot be completely eliminated. Moreover, an effective fulfillment of these plans depends mostly on the initiative and capabilities of the socialistically organized producers--from the worker and foreman to the top plant or VHJ.

I fully agree with Doc Vladimir Kyzlink's view that price, profit, and return on investment together with a system of individual and enterpise economic incentives are the most important economic tools and measurements. An especially important question is the formation and effects of wholesale prices. The function and effect of other economic instruments, which are included in the price even though they have a certain relative independence, depend on its [the wholesale price] quality. In order to fulfill its function as an indicator of management efficiency of the individual economic units, it must include the socially necessary labor costs--its value. Already its composition, which originated in conditions of extensive development, contradicts this principle. On the average, the wholesale

price is set below its value. This way the amount and structure of production and distribution costs are affected because industries purchase their production materials at wholesale prices.

I also agree with Doc Vladimir Kyzlink about the need for uniformity and maximum objectivity in pricing in relation to world prices. Price differentiation which takes into consideration the different plant conditions leads for the most part to a conservation of antiquated methods and does not favor innovations in enterprises. A transition to world prices is certainly a complex and long-term process. Yet, I think it can be achieved. For a stated time, the individual enterprises would be accorded constant price subsidies and thus it would be clear by how much their individual worth differs from the social costs of labor. At the same time, it would be important to provide incentives for a gradual erosion of this difference.

Prices diverge from value both up and down. This movement could be made into a much more efficient and flexible management tool. Not only to project the world market prices into our own production costs but also to utilize the price movements in foreign trade an an incentive for the enterprises to become interested in a competitive selling of their goods. This would provide a stronger motivation for the enterprises to introduce new and better quality goods and spare parts, improvement of services, etc.

12392
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COUNCIL OF MINISTERS APPROVES DISSOLUTION OF CSEPEL TRUST

Budapest FIGYELO in Hungarian 7 Apr 83 p 2

[Text] 1. a) The Council of Ministers approves the dissolution of the Iron and Metal Works of the Csepel Trust as of 30 June 1983.

b) The Minister of Industry converts the companies and certain institutions under the direction of the Trust into independent companies with full powers functioning under the supervision of the Ministry. The Council of Ministers acknowledges that certain companies shall continue their activities in the form of collective companies.

c) The Ministers of Industry appoints the directors of the independent companies and exercises the employer's rights related to directors.

2. The Council of Ministers establishes, as of 1 July 1983, on the basis of (2) of paragraph 53 of Law VI of 1977 concerning national companies:

   a) A Council of Directors of the Csepel Works (Council of Directors); and
   b) An Industrial Center of the Csepel Works (Industrial Center).

3. The members of the Council of Directors are: the president of the Industrial Center and the directors of the independent companies. The president of the Council of Directors is the President of the Industrial Center.

   The Council of Directors decides on:

   - Common infrastructural improvements;
   - Utilization of company territories for investment programs of expansion;
   - Reconciliation of internal or external strategies in case of collective marketing of the companies and common tasks of international cooperation;
   - The conditions of the use of a common trade name, and the tasks of merchandise and firm advertisement of common interest;
   - The organizational and functional system of the Industrial Center.

The Council of Directors will determine its own system of activity, including that of decisionmaking, subject to approval by the Minister of Industry.

4. The Industrial Center is a corporate body, and the president is its chief executive officer.

In matters belonging to the jurisdiction of the Council of Directors, the Industrial Center examines and analyzes the problems of economic interdependence for the Council and takes care of all work concerning preparation, organization and coordination related to the activities of the Council of Directors.

The Minister of Industry establishes the fundamental rules of the Industrial Center, thus determining its tasks.

Employer's rights concerning the president of the Industrial Center rest with the Minister of Industry.

The quota of staffing and the system of management of the Industrial Center is determined by the Minister of Industry.

The Industrial Center's maintenance expenses are borne by the companies, according to a proportional system determined by the Council of Directors.

5. The Minister of Industry, in cooperation with the concerned cabinet ministers (and directors of organizations of national significance), is responsible for the execution of the tasks related to the modernization of the organization and leadership of the Csepel Works.

6. This decision takes effect on the day of its proclamation.

12214
CSO: 2500/239

ENTERPRISE BALANCE SHEETS REVEAL PROBLEMS

Analysis of Financial Woes

Budapest FIGYELO in Hungarian 21 Apr 83 p 4

[Article by Mrs Janos Urban: "In A Difficult Financial Situation"]

[Text] It is a regularly recurring task of the Finance Ministry's Control Department to prepare a report about those economic operators which are in difficult financial situations--which operated at a loss, lack distribution funds and are expected to lack development funds next year--based on the year-end balance sheets of the enterprises and cooperatives.

Based on the data of the 1982 balance sheets, 77 enterprises and cooperatives* can be considered to be in a difficult financial situation. Of these 77 economic operators:
--Seven have losses and lack distribution and development funds,
--Six units have losses and lack distribution funds,
--Five economic operators have losses and lack development funds,
--Twenty-two enterprises and cooperatives have losses "only,"
--Five economic operators lack distribution and development funds,
--Nineteen "only" lack distribution funds, and
--Thirteen "only" lack development funds.

Reasons for the Losses

The number of economic operators finding themselves in a difficult situation is very high--compared not only with last year but also with the last decade. The national economy's incressingly difficult situation is demonstrably reflected in this.

Not only the number of economic operators had gotten into difficult financial situations but also the amount of financial shortage were the highest in 1982. Of the 77 economic operators, 43 are industrial enterprises or cooperatives, and 91.5 percent of the shortage shown was concentrated here.

*Without trust headquarters, trust member enterprises, agricultural cooperatives public works associations of a local character and savings associations.

Development of the number of units in a difficult financial situation, and the amount of the shortage, in the last five years

Years	Number of units with losses or lack of funds	Anount of loss or lack of funds billion forints)
1978	43	1.2
1979	42	1.1
1980	35	0.8
1981	34	7.5
1982	77	10.4

There were 5.5 billion forints of loss in the national economy as a whole in 1982--without the water works associations of local character and the savings associations--0.7 billion forints (14.2 percent) more than in the previous year. Of the losses, 2.8 billion forints are losses of a technical nature at the 11 trust centers and trust member enterprises, 0.7 billion forints of loss occurred at 86 economic operators of agriculture and forestry management and 2 billion forints of loss were generated at 40--other than agricultural--independent enterprises and cooperatives.

In the nonagricultural branches the number of economic operating enterprises and cooperatives operating in the red doubled compared with the previous year, and the amount of the loss increased more than one and a half times. This increase in the amount of loss was caused by losses at a few "large economic operators." One year earlier, losses exceeded 100 million forints at 2 economic operators, while they did so at 6 in 1982. The number of economic operators--seven--repeatedly in the red, is also higher than last year. Losses for three of them further increased as a result of defective implementation of last year's plans of action, while at four enterprises the measures during the year decreased the losses but the decrease of losses reached and even exceeded the planned losses only at the Heves Megye's State Construction Industrial Enterprise.

The factor that caused losses most frequently is decrease of production. Increased costs are seen at almost all economic operating units with losses. But we must think not only of those cost items (raw materials, energy, banking costs, etc.), the increase of which affected all the economic operators in the national economy, but rather of the costs of those new facilities which operated at low levels of utilization of their capacities; the payment of wages without performance; the costs of quality rejects and other quality problems; car standby fees, punitive interest rates, forfeitures, late payments and interests, all of which increased. All these are items which cut into the profits and which at the same time qualify the economic operation.

Shortcomings in management and in production organization, production control and laxness in work discipline as well as the lack of planning in sales also contributed to operating in the red.

Lack of Funds

Last year, a 111.3 million-forint shortage of distribution funds developed at 37 economic operators. The number of operators with lack of funds increased more than fivefold, while the amount of funds lacking doubled. At 13 economic operators the lack of distribution funds was related to operating at a loss, while at the other units it was related to decreased profits.

The situation of the economic operators was made more difficult by the central measures taken during the year which also affected the rules of wage management. One of these prohibited the use of the reserve fund for supplementing the distribution fund in a case where the fund shortage occurred due to wage improvement payments [made to the budget, i.e., taxes on raises.] Thus, 10 economic operators developed a lack of distribution funds in spite of the fact that they have reserve funds in excess of the amount of the shortage.

For economic operators with distribution fund shortages the extent of increase in wage level is generally small. For one-third of them, it does not reach three percent, and for another third it is between three and five percent. But there were exceptions, and for five economic operators--the Szeghalom Construction Industrial KV [expansion unknown], the Hungarian Communication Technology Association, the Nograd Megye AEV [State Construction Enterprise], the Heves Megye AEV and the Bridge Construction Enterprise--wage increases were well above average (between 8.1 and 16.0 percent). Almost every one of these are construction industrial economic operators and three of them not only lacked distribution funds but also are operating in the red.

For 30 units of the national economy's enterprises and cooperatives, the development resources which are formed from profits and supplemented in case of need from the reserve fund as well as formed in other ways will not be sufficient to cover the obligations of the development fund. The shortage is 8.3 billion forints, 2.1 billion forints more than in the previous year. Some 80 percent of this is concentrated at 2 economic operators--Csepel Iron and Metal Works and United Incandescent. The increase in the number of economic operators expected to have shortages in their development funds (nearly twice that of the 1981 figure) indicates that the differentiation among the economic operating units has also increased from the viewpoint of development resources.

The cause of the fund shortages is the obligation to repay the large number of loans taken out in previous years. At seven enterprises the obligation to replenish their revolving funds also contributed to the shortage of finances. Some factories and factory units which became independent during the course of reorganization of the large enterprises and trusts inherited obligations of such an extent that their development funds--usually repayments of loans--for the coverage of which they do not have the necessary resources were burdened.

The Method for Putting Things in Order

Of the 40 economic operators operating in the red, 29 can handle their losses from their own resources. Intervention is needed at 11 enterprises and cooperatives, and at these the loss after drawing in their own resources is 0.6 billion forints. At several economic operators the opportunity will open up for putting their distribution fund shortages in order after the 1983 profits are disbributed. For some of the economic operators the supervisory organs will make decisions about the methods for putting their fund shortages into order, within the framework of salvage procedures.

At more than half of the economic operators with development fund shortages--mainly at the smaller economic operators--the lack of resources can be considered temporary. For another portion of the economic operators, the excessive amounts of indebtedness can be eliminated only over the longer range. Loan reschedulings repeated each year will not solve their problems.

Greater Number Involved

Budapest NEPSZABADSAG in Hungarian 19 Apr 83 p 4

[Article by K. B.: "More Enterprises Are in a Difficult Situation"]

[Text] Last year--as a result of the effects of the world market and of the stricter economic operating requirements--the financial situation of the enterprises and cooperatives became differentiated to a greater extent than before. As a result of this, a total loss of 5.5 billion forints was generated at the enterprises and cooperatives which operated in the red, and this is 14.2 percent more than in the previous year. The number of economic operating units operating in the red or with a shortage of funds decreased in agriculture, but the amount of financial shortage here also increased by seven percent. A total of 108 agricultural cooperatives closed the year with losses, and at 62 of them the financial shortage will have to be alleviated by central means.

The number of economic operators operating in the red has doubled in industry in comparison with the previous year, and the amount of losses has increased more than one and a half times. The increase in the amount of losses was caused by a few major enterprises going into the red. (In 1981 2 economic operators had losses in excess of 100 million forints, but last year 6 of them had such losses.) The number of those who are in the red again has also increased.

Ninety percent of the losses are concentrated at 15 industrial enterprises supervised by ministries. One-half of the economic operators in the red in the construction industry are also supervised by ministries. The number of economic operators in the red has also doubled at the council-supervised enterprises, but the amount of losses decreased from 70 million forints to 20 million forints.

According to the analysis done by the Control Department of the Ministry of Finance, the most frequent reasons for developing losses are decrease of

production, changes in the market demand as well as increased costs and, in general, slow response to the changing economic environment. The shortcomings of management and production organization are also contributing significantly to the losses at some enterprises. Of the above 40 enterprises and cooperatives in the red, 29 can put their financial situations into order with their own resources, self-liquidation or mergers may take place at 4. It is justified to perform the salvaging procedure at 3 of the economic operators, while it is expected that the government will make the decision about the future financial organization of 3 significant enterprises.

The financial difficulties are illustrated by the fact that the number of enterprises with distribution fund shortages increased more than fivefold last year, and the amount of the shortage has doubled. Based on the enterprise balance sheets, it is expected that this year 30 enterprises and cooperatives will be struggling with development fund shortages. Compared with last year, their number increased by 12, and the shortage is 1.2 billion forints higher than last year. This is the first time for 23 enterprises in such a difficult situation. But there are also seven enterprises in this group which for years have been unable to reestablish their financial equilibria, and their economic operations continue to fail to ensure the formation of financial funds necessary to cover their obligations.

It must also be noted that these financial difficulties are not appearing one at a time at the economic operators but in groups in some cases. If we "filter" these out, then 77 enterprises and cooperatives are qualified as being in a difficult financial situation, compared with 34 economic operators last year. It has not happened in a decade that the number of economic operators with losses and with a shortage of funds was so high.

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TECHNICAL DEVELOPMENT FUND POLICY FOUND DEBATABLE

Budapest NEPSZABADSAG in Hungarian 14 Apr 83 p 3

[Interview with Bela Rabi, state secretary of industry, by Mihaly Tamas: "Better Results from Less Money"]

[Text] Today, when the growth of national economies has slowed down, it can be observed that technological development has received greater impetus all over the world. Developed industrial countries try to decrease production costs with new materials, products and technologies. What is the situation in this country? We asked State Secretary Bela Rabi, first deputy minister of industry, about this.

[Question] In your opinion, with what degree of efficiency are domestic enterprises using the technological development monies?

[Answer] The way I see it, the great majority of them are managing them well. As a result of economic pressure and of the central measures, technological development funds have in recent times become rather tough money. The regulatory system which went into effect at the beginning of this year has fundamentally changed the method of forming funds. The technical development funds formed according to specified keys remained only in the machine industry and chemical industry taken in the broader sense. In the remainder of industry the enterprises (even the council-operated and cooperative enterprises) decide for themselves whether they will form a technical development fund, and if so, how much they will put into it. This measure places greater responsibility on the enterprises than before. Now it depends on them not to sacrifice tomorrow's technological level in the interest of short-term savings.

Unused Sums

[Question] As far as I know, last year the unused technical development funds that the enterprises had continued to increase. This is strange also because in the meantime we hear it all over the country that they cannot keep up with their foreign competitors due to the lack of money.

[Answer] From 1981 to the end of 1982 the unused technical development funds on record did in fact increase in industry by about 2 billion forints.

However, one must be careful not to draw incorrect conclusions from this. A more thorough analysis shows that some enterprises have been intentionally saving their money for years for the purpose of some larger developments. This is how the testing track of the Raba Hungarian Railroad Car and Machine Factory will be built, at a cost of over half a billion. It will serve several enterprises. The new research base of the Biogal Pharmaceutical Factory, which is indispensable to modern pharmaceutical research, will also be built this way. I am not saying by this that there is no lack of planning and a management with a lack of ideas behind the remaining funds at times.

[Question] Could you give an example also of this?

[Answer] Due to the lack of a unified concept, the press industry has been unable to make use of its financial tools for years. There have also been examples when due to the poor innovative ability of enterprise management, we had to make the decision of replacing some managers. This is what happened, for example, in the case of the Peremarton Chemical Enterprise. Not all enterprises are able to keep up the same way with the increasing requirements. In such cases the Ministry of Industry conducts an investigation and if the circumstances justify it, naturally it will help the enterprise over the critical point. But basically the development of enterprising ability and an increase of self-motivated activity are needed.

[Question] I would like it if you also mentioned a few enterprises where in the judgment of the Ministry the technological development work is outstandingly good.

[Answer] The comparison is very difficult. Many viewpoints must be taken into consideration, overall evaluation has to be made, only enterprises with similar conditions can be compared, etc. And yet, watching the economic operation of the enterprises over a longer time, a certain picture develops. In our opinion technical development is very good at Medicor [Medical X-Ray Equipment Enterprise]. This enterprise does not try to be self-sufficient in development; rather it is taking advantage of the benefits of organized cooperation. Between 1975 and 1980 they put 165 new products on the market, and these have also gained recognition in the developed industrial countries. Or I could mention the Industrial Instruments Factory which has developed links of close cooperation with enterprises making similar products in the CEMA as well as in the capitalist countries and which has solved the problem of producing a series of components and subassemblies considered to be scarce. The United Pharmaceuticals Factory has developed two new plant protection chemicals, which are considered novelties even in worldwide respects. In light industry the technological development activity of Graboplast is exemplary. Its products are stylish, inventive and in demand. The enterprise's product structure is almost completely renewed every 3 or 4 years. Fortunately, there are several other good examples also, since I could analyze the same way the results of the Flax Spinning and Weaving Industrial Enterprise, the Machine Tool Industrial Works, the Kobanya Pharmaceutical Products Factory or the Danuvia Central Tool and Equipment Factory.

[Question] The central organs, including the Ministry of Industry, are the subject of many complaints and much criticism because of the use of the

centralized technological development funds. Many people do not consider investment of the money sufficiently circumspect and successful. What is your opinion about this?

[Answer] When I look back at the earlier years, I see that there was a better basis for this conclusion at that time. It is not so true today. Earlier the ministries supported the various enterprise initiatives from the centralized technological development fund, even though they were not always convinced about the success of these. The topics included in the national medium-range research and development plan were also financed from this fund, where there was even less control. Then came 1975-1976, when the conditions began to become more strict, and this became even more so with the creation of the Ministry of Industry. Since then, the centralized monies served to implement the central technological development policy. We had to terminate the approach that the chemical industry, the leather industry, etc. have toward budgets which have to be returned to where they were generated. There are no longer any branch industry budgets; we spend the money where it produces the greatest profit. This approach was already implemented in 1982. We have also eliminated the practice of the enterprises being able to obtain development monies from the centralized technological development fund without any restrictions and obligations. Today we are awarding 60 percent of the money on the basis of contracts and specify what results the enterprise is to achieve. Besides this the enterprise is also required to contribute its own money to the development fund. Thus, financing is a joint project. This method has led us to the point where in recent months we have created an industrial innovation fund. We intend this to be an experiment, and if it works out, our efforts will be that as large a portion of the centralized technological development fund as possible should reach the industry through this bank-like organization.

Compulsion and Recognition

[Question] If we do not want to fall even further behind in international competition, we should use the time of the currently prevailing economic stagnation and slow growth for the vigorous rejuvenation of industry and technology, as the developed industrial countries are doing. Instead, we are only maintaining our position in this country. Do you agree with this line of thought?

[Answer] I agree completely. We must use the recession to prepare for the business boom. And we can achieve this by research which produces results not merely intended for the desk drawer. It is not enough to go to the edge of development; something should also finally be done with technology. Unfortunately, this is made more difficult by our money shortage. In 1981 the Ministry of Industry's centralized technological development fund was 2.604 billion forints. Last year this amount decreased; then this year it shrank to 1.274 billion.

[Question] "If the enterprises are not compelled by their own conditions and interests to technological development, directives cannot do so." I

read this in a presentation. My question is: in your opinion, to what extent do today's circumstances provide compulsion?

[Answer] The circumstances do compel. The only question is how well the enterprise's management recognizes it and how fast it reacts. Thus the essence of the question is to be sought in the conceptualization, the ability to react and--with a stylish expression--the creativity of management. It is a different question whether the enterprises living in terms of short-range interests are dealing with technological development which lays down the foundations for longer-range growth. There are good examples for this (for example, the pharmaceutical industry, the electronics industry and part of the machine industry), but there are also examples to the countrary. I think, in addition to letting the independence of enterprises develop, we must also seek those methods which strengthen the long-range interests of the enterprises.

[Question] It can be observed at some enterprises that they equate and confuse technological development with the purchase of machinery. This can be seen clearly if we examine the use of the sums earmarked in the national medium-range research and development plan from the viewpoint of how much of this they intend to spend on research and development and how much on purchasing machinery (for example, in the area of preshaping, automation or tool manufacture). It would be good to change this attitude. What is Comrade State Secretary's opinion?

[Answer] We have been dragging around the problem of confusing the MUFA [Technological Development Fund] with investment money for years. We try to supplement the hard-to-obtain investment loans with technological development monies, which are easier to get. Of course, it must also be seen that there is no research without equipment. But when the equipment becomes dominating and exclusive and development stops, naturally one has to intervene.

[Question] Enterprise managers and directors of engineering are saying that they are not receiving enough assistance from the research institutions to develop competitive products, that is, to increase the export merchandise base. They complain mainly about two things. One: development takes too much time, and they are late on the market because of this. The other: most of the time they are left alone when the new products have to be shepherded from prototype to mass production. In your opinion, how can this be changed?

[Answer] It is true that the research institutions in many areas today are not yet performing sufficient production and market-oriented activities. But we have already recognized this problem earlier and taken several steps aimed at bringing production and research into a close unit. This is served, among other things, by an earlier decision of the Scientific Policy Commission, according to which one half of the industrial research institutions have been converted to technological development enterprises or have become the joint research institutions for several enterprises. The

industrial research institutions operating in the enterprise economic operation system performed about 75 percent of their work in 1981 on the basis of assignments by the enterprises. But even today the preparedness and personnel makeup of some of the institutions is not of the kind that they would be able to provide appropriate assistance to the introduction of research results at the plants. Hopefully, the forms of cooperation which will also cover the joint acceptance of risks and the fact that the research institutions will increasingly share in the profits of the enterprises will also change this. By the way, a decided excitement has been experienced recently in the contacts between the two parties, especially in actions aimed at substituting for imports.

[Question] What information does the Ministry of Industry furnish to the enterprises to enable them to make decisions about technological development questions in accord with (in the spirit of) the long-range ideas of industrial management?

[Answer] In addition to the regularly held information sessions for managers, we provide information in the debates concerning the development strategy of an industrial branch or major enterprise. We hold consultation meetings when the annual and the medium-range plans are prepared. But the supervisory committees as well as the various trade publications such as, for example, the Ministry's magazine, IPARI SZEMLE [INDUSTRIAL REVIEW], provide orientation to enterprise management.

[Question] Many people criticize that the import duties on modern technology are higher than average. It would be reasonable to change this. Has the Ministry of Industry made such a suggestion?

[Answer] We do not agree with the high import duties on modern technology and on imports that bear new technological information. We consider the changes necessary. We have initiated a solution to this question within the framework of the comprehensive modernization of economic management.

[Question] If we do not have enough money for technological development, then we should make better use of the least costly sources of information. But it seems that the opposite of this is taking place! The enterprises are no longer allowed not to finance by themselves the learning trips to the socialist countries, and the purchase of foreign trade magazines has also been limited, cut back. Many people doubt that this was a reasonable step of savings. Do you agree with this?

[Answer] I am glad that you brought up this question because I consider it important that the economic difficulties not lead to measures that have not been thoroughly considered. We have initiated steps regarding the new system of trips abroad and reinstating the acquisition of trade magazines to the justified level. And beyond this we have requested that imports of spare parts for equipment needed for research and development not be limited administratively.

The Excessive Number of Programs Has a Fractioning Effect

[Question] How well can the Ministry of Industry implement the unified industrial policy ideas, or in another word, how well can it coordinate the technological development activities of the enterprises? Opinions are heard rather often nowadays that even though there are central programs, we are not using the available money in a sufficiently centralized manner. Instead, unnecessary and senseless competition exists in a number of areas. What is your opinion about this?

[Answer] It is rather difficult for us to implement our industrial policy considerations in the area of technological development. There are several reasons for this. The more difficult economic conditions have a role in this, and the basically short-range interests of the enterprises also exert a contrary effect. Besides this, we have not yet been able really to develop the new and more effective methods and systems of technological development in the Ministry. We also consider the number of central development programs selected too high. Maintaining this can lead to scattered resources and the development of unhealthy competitive situations. We have therefore proposed a decrease in the number of programs, for the more expedient and selective use of the existing means. But in the present world economic situation it is not easy to outline correctly the possible development paths of the national economy--and from this it follows that defining the main directions of technological development is also not a simple matter.

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MINISTRY OFFICIAL DISCUSSES TRADE WITH WESTERN COUNTRIES

Warsaw SZTANDAR MLODYCH in Polish 19 Apr 83 pp 1, 3

[Interview with Antoni Karas, Ministry of Foreign Trade undersecretary of state, by Jacek Swidzinski]

[Text] [Question] Minister, we have suffered a serious setback in our trade with western countries. How does it manifest itself, and what are its causes?

[Answer] Our trade with western countries is one of the crucial elements involved in our nation's economic crisis. The first indications of regression appeared as far back as the beginning of the mid-1970s. Currently, in our trade with western nations we are dealing with a type of stratification of negative phenomena of recent or longstanding origin. I would like to present their general structure.

Our accepted developmental strategy in the 1970s, presumed that the tremendous growth of credit investments from these nations would result in the dynamic growth of our exports, allowing for the periodic repayment of the accrued debt, and the continuation of a stable and growing trade. Trade with the western nations, however, assumed a shape incompatible with these assumptions.

In truth, our exports grew up until 1980, but the growth rate was too weak. During the entire last decade we imported each year more than we exported, in practice. This occurred despite the fact that since 1977, import growth from these nations was checked and even decreased.

Our export earnings were not sufficient for debt repayment, nor for satisfying the economy's needs for imported goods. The development of the Polish economy appeared to be very import-intensive. At the sametime, agricultural problems of the mid-1970s forced us to appropriate a major portion of our export earnings for fodder and grain purchases, while not resulting in any actual production or export gains.

In this situation we were continuously running up new debts, allocated in the majority of cases not for investment purposes but for subsidizing domestic production and consumption. They were granted on a short-term

basis and at high interest, and this quickly encoumbered our balance of payments. As a result, an increasingly small portion of our hard currency earnings from exports was available for imports, and had to be allocated for debt repayment. At the beginning of the 1980's, our ability to import on the basis of our export earnings was almost entirely eliminated. Between 1980 and 1981, we were in no position to regulate our payments. In April 1981, we negotiated the rescheduling of the loans falling due this year with our principal creditors. Our trade crisis with the West accelerated in 1981. The lack of sociopolitical stability seriously intensified the economic difficulties. Western clients began to turn their backs on Polish partners, and failed to guarantee deliveries of goods. The decreased export of coal to the West, however, had the most intense impact. The internal situation in our nation also had an unfavorable effect on our financial dealings. In 1981, Polish imports and exports with the West declined by approximately 25 percent.

It should be stressed that the loss of every export dollar, or a delay in obtaining precludes or delays needed imports, on the basis of feedback, and brings about adverse results in export production.

The year 1982 signaled the beginning of the rebuilding process of our economic situation, to which the NATO countries responded with the well-known politically-based economic sanctions, and isolated us from our international financial sources. Thanks to a growth in coal extraction, we were able to slowdown the falling exports to the West, which were 1.2 percent lower than in 1981. Because of the economic sanctions and the continued insufficient exports, imports from these nations fell by an additional 25 percent. Nonetheless, we achieved a small trade balance surplus with the West for the first time since the beginning of the 70's.

[Question] What in your opinion will our trade with the West be like by 1985?

[Answer] This will depend upon a series of factors, some indeterminate. Growth of exports to the West is essential for us to overcome the currency barrier, which limits our imports from these nations and therefore our production. The regulation of our payment problems will be of cardinal importance in our trade with the West. We cannot, in any case, agree to have the amount of repayment paralyze our economy, and impair the principles guiding our national existence. Deputy Premier Janusz Obodowski spoke about this recently in a PAP interview. This is also in the interest of our western economic partners. They cannot expect rapid debt repayment, and at the same time try and consciously prevent us from regaining our national economic balance.

Insofar as production potential is concerned, we possess the prerequisites to achieve or surpass in 1985 and 1980 levels of exports to the western nations. This, however, depends largely upon our dynamic export production in all sectors of the economy.

[Question] In the near future, in what direction should our trade with the West develop?

[Answer] Basic raw materials such as coal, sulfur, and copper will continue to play a significant role. It is necessary, however, for us to rapidly mkae up our export losses in the processing industries, especially in the electromachinery sector. In the immediate future, this should become the proverbial locomotive which will direct our export production. Specifically, we must perfect licensed production, and develop our own technical solutions. We must utilize all means of export production, wherever they may be found. We must break out of thevicious cycle of insufficient imports, exports, and production, by not neglecting our opportunities for manufacturing effective exports. I believe that despite supply problems, we still possess the production capabilities. We support them with an important instrument, the hard currency allocations from our export earnings which are to be used for the needs of the producers and for exporters. We must seek out opportunities for increasing our exports, especially in places where unutilized production capabilities are evident. This is also a matter of social concern in light of the factory economic cost, the problems concerning work done on the site, etc. I believe that the economization program should allow for the increase in exports in all fields, especially in the raw materials and other materials sectors.

Industrial cooperation plays a decidedly insufficient role in our relations with our western partners. In recent years, we have observed its deterioration. I believe that this form of trade will flourish under economic reform conditions and the resulting factory self-management opportunities.

It is worthwhile to note that a major portion of the industrial goods trade between the western nations consists of spare parts and production components.

In the case of imports, it will have to be limited to the most essential needs. I wish to underline that the slogan "we will feed ourselves," is currently not only a matter of great social significance insofar as the present and the future of our nation is concerned, but i also represents the opportunity to decrease our imports and develop our production for export and agricultural needs.

[Question] Do you believe that our intentions concerning increased exports to the western nations corresponds with the state of affairs which prevails among them, and with the appearance of protectionist tendencies?

[Answer] The economic situation in the West is ill-disposed toward us. I believe, however, that because of Poland's low export levels to the majority of the western countries, that we continue to have the opportunity for export growth. For a number of reasons, the current state of affairs demands adaptation on the part of our manufacturers. In the difficult, and intense competition which accompanies the recession, it is necessary to adapt to its specific needs, such as prices, quality, promptness, and technical services.

Protectionist tendencies come about as a result of the recession, and are often discriminatory towards the socialist nations. In such cases, the inconsistencies of the capitalist system are manifested. Anyone who can wants to export. Many domestic manufacturers look unfavorably upon foreign competition. Despite many protectionist conflicts, the western nations have up to now succeeded in avoiding total confrontation in the form of a trade war. Indications of such conflicts have been sporadic up to now. We must therefore act according to the conditions which exist. The various protectionist manifestations do not escape our notice. We try to solve these problems through bilateral agreements, and also through GATT. We are particularly concerned with counteracting any type of discriminatory practice which is politically motivated, or has specific economic objectives. We cooperate closely with the socialist nations in this respect. I believe, however, that our creditors are short-sighted and superficial, considering our mutual financial relations at this time. If they attempt to delimint the volume of our access to markets for these or other goods. An obvious sign of discrimination is the U.S. repeal of Poland's Most Favored Nation status. It will limit our export sales on this market by as much as $100,000,000.

[Question] In light of the analysis carried out by you concerning our trade deficits with the West, the question remains, what will the near and distant future bring for Polish specialized exports?

[Answer] Export specialization is a "driving license" of sorts, in current international trade. Export represents a permanent element of technical and economic culture for contemporary society, and as such must not be a result of chance, good intentions, or improvization. Specialization should not be decreed or subordinated to academic proposals. It must be a result of current necessity which comes about from the economic needs, the status of individual firms, and a knowledge of foreign markets. I believe that economic reform brings us closer to this mode of thinking. I feel, however, that we must establish the economic reform apparatus which will force our manufacturers to be unable to exist without exports, despite a large domestic demand.

Inasmuch as reform presents the manufacturer as the most important element in the inspiration and implementation of specializec exports, it does not mean that specialized exports would remain outside the widely understood realm of economic and trade policy. In this respect, the foreign trade apparatus is an important informational and consultative unit. The economic administration can and should influence these processes through its intermediary capabilities.

We must, however, realize that a serious return to specialized export will necessitate investment of capital. Even so-called "minor modernization" will not resolve this matter. I believe, that gradually we will have to renew our investment imports from the West. We must, however, concern ourselves with developing the system mechanism which will enable us to carry out a rational specialized economic policy, without infringing upon enterprise freedom of action.

We must exploit all manifestations of specialized production which exist in the current economic structure. In spite of a lack of means, we must now begin to shape our perception of the future, and analyze the variants and directions for specialization which we will accomplish gradually. Insofar as goods are concerned, it is not only machinery and industrial goods which should be considered as specialized production, but also certain raw materials, and agricultural-comestible goods. One condition to be considered would be profitability.

[Question] Won't the dependence on western imports continue to have a negative influence on our economic situation?

[Answer] Our weakness is not so much the dependence on imports, but the fact that the size of our exports does not correspond to the import needs of our economy. I do not mean to say that the structure of our imports from the West is sound and fulfills our concept of participation in the international division of labor. I am of the opinion that today the size, as well as the structure of our import and export trade with the West should conform with our economic potential. In the future, this potential must be shaped so as to decrease our dependence on imports from capitalist countries. I would label the current payments problems which we are experiencing with respect to imports as a transitional abnormality. Yet it is a problem which must be seriously resolved, considering the existing situation. We are trying to achieve an economic policy variant in which these negative effects will be minimized. In other words, we seek an alternative for western imports, for which there is a shortage of funds. We have found a series of such opportunities, especially in the Soviet Union and in other socialist nations, and to a certain degree in the developing nations. Here, I would like to stress the role which the socialist nations particularly the Soviet Union play in this process. From them, we receive additional raw material deliveries over and above the plan. We have initiated processing using existing Polish processing capabilities and additional raw material deliveries, the results of which we share 50-50, as well as deliveries of indispensable components which we formerly imported from the West. We are also initiating the manufacture of imports substitute goods.

We must, however, consider that in the uncertain future there may be a shortage of alternative sources of supply for certain imports from the capitalist nations. In such cases, it will be necessary to readapt our production, even if this would not be the ideal solution. These are the realities with which we must cope. The economy and society must continue to function, and cannot come to a halt merely because of a shortage of western imports. I believe that our western partners should also realize this. In the near future we may be able to achieve a veritable restructuring of our foreign trade, and in many cases it may assume features of stability.

[Question] Are we considering more complex forms of economic cooperation with the western nations, such as joint ventures, or cooperation in third country markets?

[Answer] The matter of joint ventures, here I'm thinking of major ones, has been under discussion and consideration for a while. Legal regulation is needed in this case. Since foreign capital is not guided by charitable inclinations. We, in turn, must also take our interests into consideration. Discovery of an appropriate formula for the fulfillment of these conditions will not be easy, because of the organizational and systemic difference.

The numerous unterminated investments, and the free manufacturing capability could serve as the potential base for such cooperative efforts. The specification of a direction or sphere of activity (aside from the legal regulations), as well as the future economic and financial stabilization of our nation will be essential for the achievement of this cooperation. Since foreign capital dislikes uncertainty and risk.

Cooperation in third country markets as a subcontractor for investment projects being fulfilled by our western partners, chiefly in Third World nations is not novel, in fact we already have fairly broad experience in this area. I believe that this represents a promising trend for future cooperation.

[Question] We've talked only about the present and the near future. What is your perspective on trade with the West after 1985?

[Answer] To a certain degree it will be a projection of trends which will be shaped within the next 3 years. In spite of the complexity of the present-day world, I am an optimist and believe that the view will prevail in the West that there is no alternative to the easing of tensions and international coexistence. This would be highly advantageous for our economic and commercial relations with the West.

Also important is the perception of how our western partners view economic relations with Poland on the average or for the long term. I believe that in a short while they will express their opinions in matters relating to Poland's debt. In the light of their current policy, the majority of answers to this question belongs to them.

I would be pleased if they were to realize that their economic interests will also depend on this policy which they practice towards our nation. Poland represents a market of 36 million. It is a potential partner for broad economic-commercial cooperation. I believe that if our policy of economic restoration were to coincide with their constructive approach to economic and financial cooperation with us, this would establish the basis for undertaking after 1985, a process of growth of bilateral trade, above the levels achieved in the past.

[Interviewer] Thank you for the interview.

12229
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FLOOR DEBATE AT 9 MARCH REFORM COMMISSION MEETING SUMMARIZED

Warsaw RZECZPOSPOLITA in Polish 24 Mar 83 Supplement p 4

[Report of Economic Reform Commission: "Introduction and Effects of the Economic Reform in 1982, Discussion"]

[Text] The discussion was concentrated on four subject areas: transitional solutions, inflation and reform, threats to reform and evaluation of the working version of the report.

1. Transitional solutions. The majority of the participants favored the exclusion of an automatic 2-year extension of the temporary solutions resulting from the conditions of the transitional period. Nevertheless, in individual areas it is necessary to introduce new corrective solutions meeting real needs. These solutions should be conceived in such a way that they have a chance of remaining stable for the next few years. After all, anything which hinders enterprises in extending the time frame of their activities and which contributes to constant uncertainty with respect to the systems-type solutions to be included is unfavorable.

Material supplies. There has been an expansion of direct regulation in the area of material supplies. Almost 40-50 percent of all supply turnovers are regulated in one form or another. There have not been enough limits placed on the distributive functions of the industrial subsector-type ministries. These functions have begun to revive in some associations, especially compulsory ones, which include material turnover units. The process of decentralizing housing and general construction is hampered by the establishment of monopolistic structures in construction material turnovers.

Two proposals were made against the background of these findings.

First, a check of compulsory producer associations was proposed from the viewpoint of excluding from them units dealing with turnovers of means of production. The functioning of these units within the framework of the associations considerably strengthens the monopolistic position of the producers.

Second, the entry on regulation in the transitional period should not be extended in the form accorded to it in the law on planning. This problem should be examined selectively, particularly to separate the basic groups of supply materials and to use different instruments with respect to each of them. Probably an allotment should be retained in the area of fuels, especially liquid fuels, and of some raw materials of strategic importance for our economy. In the area of raw and other materials at least two variations in solutions can be applied, of a nature differing from traditional distribution. Developing conditions favor a shift from the form of state control used in 1982 and compulsory now in 1983. Attention was also given to the fact that favoritism for large units is shown at the cost of the small units in the principle of the distribution system. There are no priorities for better use of their raw or other materials, although "small" units may use their materials better than "large ones." Therefore it should be possible to separate a certain proportion of the materials distributed and put it at the disposal of enterprises on a bidding principle.

They favored maintaining the foreign exchange currency distribution during the years immediately ahead, but with the reservation that some thought be given to modifying the existing system.

Amortization. There was a very definite expression of the opinion that the entire reappraisal of amortization allowances not be put at the disposal of the enterprises as early as 1984, because this would be premature. This would mean preservation of the old crisis-forming structures, and would launch the entire process of investment financing onto blind paths. They also voiced a proposal to divide the amortization reckoned by property estimation between the enterprise and a central fund from which central investments would be supplied, while the entire amortization quota in the reckoned amount would remain with the enterprises in the current year.

However, opinions were divided on the gradual introduction of new fixed asset values. Still, the opinion prevailed that they must be successfully introduced in the course of the next 3-5 years. The proposal also failed on the grounds of alarm caused by the gradual introduction of values appraised according to a different treatment. This would be based on changing the ratios between the fixed asset prices and the labor force prices.

Income tax. The regulation in the law on this question is really of an ultimate nature, but from the very beginning this solution has aroused a great deal of doubt. This was expressed in the report for the first half of 1982 in the idea that work must begin immediately to develop a linear formula for this tax. The positions on this subject were not specified in the current session of the commission. Actually some of the participants supported a linear tax, but with many restrictions concerning official prices, FAZ [Vocational Activization Fund] and the method of disposing of amortization. Under the existing conditions some of the supporters acknowledged that a progressive formula might be better, while some were of the opinion that modifying the current compulsory formula requires very careful treatment, and suggested returning to this subject after the end of the first half of the current year.

Scientific and technical progress fund. The question was raised as to whether the solution concerning the plant fund for technical progress was temporary. In the opinion of one of the participants the entire prospect for the technical development of enterprises is closely associated with this fund. Therefore we should not think of liquidating this fund but of strengthening it. However, other participants emphasized that actually, in the light of the deductions for these funds, they are not made authoritatively and universally for all of the enterprises. These matters depend on two factors, on the frequency of introduction of new generations of products and on the costs of putting them into production. Preparations for new generations must go through the factory technical progress fund and therefore it should be treated as a permanent solution.

2. Inflation and reform. The subject of inflation, its sources, intensification, the dangers it causes, and the methods of combating it occurred in almost all of the comments. This was the central subject of the commission discussions. Statements were in agreement with respect to two matters, despite widespread suggestions, the reform mechanisms were not a driving force in the development of inflation: its mechanisms were not deliberately directed from the very beginning toward the prevention and gradual decline of inflationary processes.

On the other hand opinions were divided on the major sources leading to the inflationary processes. Some of the participants felt that prices were the main factor favoring inflation. Therefore they primarily proposed a limitation on independence in the area of price setting, limiting the range of contract prices, a transition to official prices and freezing producer prices, all prices, and ending wih strict control of prices and penalties for unjustified price rises. Others expressed the conviction that inflation is an inevitable consequence of disruptions in developmental processes, the deep crisis and structural disturbances.

On the other hand the affirmation made, that the cause of the inflation was the free formation of emoluments, aroused strong opposition.

Attention was called to the fact that a specific phenomenon occurred last year. There was a sharp increase in wages, but it was much lower than the increase in the cost of living. There was a drop in real wages on the scale of 20 percent. Under these conditions there can be no talk of halting the movement of financial emoluments. After all, the battle for income and wages is containeed in the sociopolitical mechanism. Increasing them does not depend exclusively on different regulations in the reform measures. Therefore the systems-type regulations of the reform did not cause the inflation but, on the contrary, the reform is a chance to return to a normalization of economic life.

Law 186 encountered general criticism. This law, as one of the participants pointed out, introduced a situation similar to what has been a great misconception for 30 years in managing the wage fund, namely an automatic correction to the wage fund as a function of the extent that the quantitative production plans are exceeded.

3. Threats to reform. It was unanimously recognized that inflation and the lack of a balance are among the most dangerous threats to reform. These threats are based on the fact that inflation and imbalance cause economic mechanisms to degenerate. But how can we manage to return to a balance? The prevailing unambiguous response was that achieving a balance by means of large price increases is impossible and will not be socially nor politically accepted. However, this does not mean that wage increases in certain sectors are impossible, but that a balance will not be achieved by means of these price moves.

On the other hand an effective instrument in restoring the balance is maintaining a firm financial regime. For up to now we have not approached compliance with firm financial requirements in enterprise management. In addition to profitability, capital accumulation and their distribution, the game also includes matters of objectivizing the external enterprise management conditions, such as prices and price formation, relations with the budget and credit relations with banks. In this context as well, the majority of those speaking on this question posed the thesis that during 1982 prices were not of a parametric nature, and that they probably will not be so for political and social considerations as long as the crisis lasts. There was one other argument in favor of limiting price independence. The creation of supplementary price barriers was proposed for individual groups of enterprises in the form of differentiation of group indicators of a permissible price increase. This increase should fluctuate around an average level with the assumption that, during planning developments and analyses, it will produce a specified range for the enterprises, along with conditions which will not give rise to deviations from the line of tax measures, subsidies and so forth.

Besides a firm financial regime, proposals were also advanced to apply certain monetary and financial maneuvers as instruments to restore the balance under inflationary conditions. It was very strongly emphasized that the exchange of money should at no time enter into play.

Backwardness in adjusting the shape and function of the center to the reform tasks was recognized as a second threat to reform. Here the main danger is divergence between the degree of accommodation of the center to new conditions and the degree of accommodation of the enterprises to these conditions. The following points were documented: certain shortcomings are making an appearance and must be eliminated: a priority of quantitative planning over financial planning and an adequate priority of direct instruments over indirect instruments are needed. There is a clear tendency to reduce the time frame while indications are that solutions to the problems are to be found in a longer time frame, that is, relegation of these questions to long-term plans. This also demonstrates the hierarchical nature of relations between the central economic organs and other economic units. The result of this is maintenance of discretion in decisions, the rise of particularism and the reduction of this hierarchy to the indirect level, among other things, and expanding the branch monopolistic structures. From this can be drawn the conclusion that the center has a certain ability to conform to various reforms in the sphere of enterprise functioning, while not changing itself. Therefore a clear division of labor for the organs of the center is necessary, that is, a simultaneously clear area

of competence and responsibility for the individual spheres in the management process.

It was also emphasized that, if the reform of the center had been carried out earlier, the chances of committing mistakes would have been considerably lower. Other dangers to reform were also dealt with: incompetent use of reform mechanisms and interests, disrupting its internal logic and sometimes a conscious retreat from its principles.

Objections were also raised that the reform resolutions lack measures to stimulate improvement in the quality and effectiveness of management and to strongly affect cost reductions.

4. Evaluation of the working version of the report. It was generally held that the draft report fulfills expectations, that is, it is characterized by a firm structure, a good distribution of emphasis and a thorough analysis. The manifestation of great legislative efforts was recognized as one of the positive features of the report, drawing attention at the same time to the weakness in management work revealed during passage from the Sejm to economic life. The report was also given credit for a sound evaluation of the role of the market mechanism as an auxiliary mechanism in achieving the purposes of the national economy and for a skillful approach to the classification of production prices.

However, attention was also called to the fact that there is too little room in the report devoted to compliance with the financial regime and to matters of center organization. Many very detailed comments were also voiced. However, in general the draft report received the approval of the commission.

6806
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ECONOMIC REFORM RATED FROM RETAIL TRADE, SERVICES PERSPECTIVE

Warsaw ZYCIE WARSZAWY in Polish 25 Mar 83 p 3

[Article by Doc Dr Teresa Palaszewska-Reindl, staff member of Domestic Trade and Services Institute, and member of Task Force IV for Market-Place Organization and Performance of the Economic Reform Commission: "The Market and Reform; Hopes and Fears"]

[Text] Economic reform procedures can be considered from several points of view: the extent of preparing new legislative solutions; fluctuations in organizational structures; consolidation of reform principles in various subsectors of the economy; dissemination of those principles throughout the labor work force; and the degree of training and improving the managing cadre. Each of these points of view is fundamental and in each of them, judging from last year's achievements, one can find many positive symptoms. But in the market arena the most important point of view, and after all the most prevalent, is the confrontation of reform intentions with the realities of our present economic life. Do the solutions applied, and mechanisms of reform fulfill the intentions of planners; do they bring into focus the much desired state of a normal market?

The year 1982 is certainly too short a period of time in which to fulfill expectations associated with overcoming the crisis and a perceptible improvement in market conditions. For these reasons, an analysis and evaluation of the results of reform in the internal market arena cannot be confined to a diagnosis of the present state of affairs; they must also include issues anticipated and planned for the immediate years--and thus the 3-year plan for 1983-1985.

Eliminating Dissension

The economic reform introduced under serious critical conditions, has not yet achieved the distinction in the internal market arena that was anticipated by society and reform planners. The year 1982, despite many efforts exerted and meaningful results (a reduction in the decline of production; in many fields, expanded produciton in mining industries and some types of agricultural production, and the food industry) did not resolve essential internal market problems. Despite an unquestionable alleviation in market conditions in the area of providing food (although it is difficult to ascertain to what extent

this alleviation is to be attributed to price increases, and to what extent --to state control), market problems remained unresolved. And there are a great deal of them.

To the most important of these, there should be added, among others: a chronic short supply of many important market goods; a growing lack of an adequate supply of consumer goods and services; excessively weak effectiveness in the economic apparatus, such as prices, tax rates, etc., for pro-market orientation by enterprises, and procedures for balancing the market. It is also necessary to mention the unsatisfactory state of the contractual system; an excessively weak consumer's position in the market; insufficiently strong trade and service enterprises subject to pressures of industrial enterprises that chronically maintain a dominant position. Finally--last but not least--the unregulated problem of a main decisionmaking center in the internal market arena.

In every phase of our economic life, the process of spreading reform is the process of eliminating dissension, of replacing the old with the new (and sometimes conversely). The internal market is a terrain on which these dissensions are being eliminated with particular force. The profound imbalance, magnified toward the end of 1982 by the influx of a large flow of money, which was reflected in a considerable increase in the inflationary curb, requires many administrative actions, such as central distribution, state controlled sales, controlled sales--which are inconsistent with the essence and spirit of preliminary economic reform. The scope of these endeavors continues to be too large, essentially burdening market conditions and strengthening elements of the orders-distribution system. Attempts to depart from state control are undertaken timidly and dubiously, without a clearly outlined long-term program in this area; and what is worse, these procedures are not utilized for the current balancing of the market. For example, the well conducted operation of abolishing state control of clothes detergent and soap was not, however, sufficiently associated with price changes for these products, which should be the rule.

Principles of reform in the internal market arena anticipated support from market procedures on contractual conditions between enterprises. It was anticipated, that despite material difficulties and applied methods of distribution, the system of contracts for the supply of merchandise will be that area of economic reality, in which new principles for economic functioning will displace former distribution and order-type methods of operation. At the base of these expectations lay the conviction of equal rights for market partners, industrial and trade enterprises. How does reality relate to these expectations?

Weakness in System of Contracts

Experiences from the year 1982, and also from the past months, prove that the system of contracts continues to function unfavorably and is followed by a further deterioration in relations between trade and industrial enterprises. In sharp contrast, there are symptoms of the dictate and consolidation of the producer's position. Contracts often bear the character of unilaterally

dictated conditions for the supply of goods. They also contain a series of imposed clauses (for example, those concerning possible changes in quantity, variety, supply schedules without sanctions in the form of contractual penalties, exemption of supplies from various delivery charges, obligation to pick up supplies with one's own commercial transportation, established price guidelines, demands for relinquishment by trade of a portion of profit margins, etc.).

As was indicated in the information of the Ministry of Domestic Trade and Services [MHWiU], examined in Task Force IV for Market-Place Organization and Performance, quite frequently there is an incidental appearance of non-performance of negotiated contracts, and many plants (trades: knitting, bed linen, underwear, hosiery goods) simply refused to negotiate contracts with trade enterprises. This situation should be regarded as alarming. It requires the adoption of actions that will restore a proper role to contractual relations between suppliers and consumers, so essential in the process of reforming the economy. For this reason, it is necessary to reflect upon the possibilities for fundamental reconstruction of the existing contractual system in the direction of strengthening the discipline of contracts, the mode of setting contractual penalties, obligatory claims by virtue of this, a preference for definite kinds of contracts (for example, government contracts).

It seems necessary to keenly observe the manner of using modified regulations concerning sales contracts and supply contracts, (Council of Ministers resolution No 207 of September 1972) which, although in contrast with former resolution No 192, represent visible progress, however, they contain a good deal of "loop holes". With intentions for further modifications in the system of contracts, there should be a strengthening of the consumer's position and rights.

Contract Prices--Negotiated or Dictated

Planned reform intentions attached great hopes to contractual prices. It was anticipated that they would change in the process of normal trade negotiations among market partners--production and trade enterprises, representing a dominant position in many trade markets. The experiences of 1982 brought essential changes. The economic reform introduced under circumstances of profound crisis could not permit prices to continue as a factor fluctuating exclusively under the influence of the demand and supply ratio. In addition to contractual prices, official and regulated prices were introduced for many goods. A number of contractual prices in turnover decreased considerably, although in varying degrees in various trade markets.

The process of reducing the number of contractual prices continues unabated. For 1983, the list of price regulated goods was expected to include 51 additional items. At the same time, the character of contractual prices underwent changes in many cases. From intended negotiated prices, comprising the factors of the demand and supply ratio, they became prices dictated by producers, based on (chronically too high) production costs. The attainment of economic results in many cases took on the form of price increases, without

vital, planned growth in the effectiveness of management in the assumption of reform (growth in labor productivity, control of raw and other material, etc).

Results of studies conducted by the Institute of Internal Trade and Services* on the role of contractual prices in market turnover during 1982, indicate that the number of articles at contractual prices in supply on the market fluctuated in an extremely unique manner in various trade markets.

Is this true mosaic of the varied participation of contractual prices in trade markets the result of long-term intentions to change the price structure in contemplation of preserving the basic consumption of goods, and a program to arouse the interests of enterprises in market production? Or is it rather also the result of current policy, shifting between the need to protect the public standard of living under critical conditions, and the existing structures of our economy which had been revised many years ago? A response to the question is not possible now; it requires further observation and analysis. However, it is indeed presently known from the experiences of 1982, that contractual prices, intentionally planned as negotiated prices, "understood" by market partners in the course of trade negotiations, are as a rule, the result of the dictate of suppliers, based either on structural (for example, the monopolistic conditions in a given trade, lack of other producers) or supply principles (access to suitable raw and other materials).

A contributing factor in the process of negotiating prices would have to be a certain freedom in the selection of one from among the many possible suppliers, and proper commercial cost accounting--that is more profitable, or a costlier product, but of better quality, or less expensive but of inferior quality. Under current critical circumstances in the sphere of material supplies, in the pursuit of all sorts of goods for the market--with compulsory intervention in the turnover of many components--there is practically no place for healthy commercial endeavors of this type. But the current pathology of contractual prices should not determine their negative value, because commensurate with the gradual recuperation of the economy--they can play a positive role, if the system of contracts consistently improves and legislative endeavors are adopted to break the monopolistic positions of many economic groups (in production, as well as in turnover).

The complicated picture of market conditions that emerges from present studies, dealt only with superficial features of the market. A correct diagnosis and possible therapy requires keener efforts. An extension of the analysis must proceed in two directions: ascertainment as to what degree reform solutions in 1982 (and the application in 1983) stimulate the attitudes of enterprises for the development of market production, and--determination of the position of the final recipient of all processes--the consumer in the market under reform conditions. These matters, however, require separate treatment.

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* D. Sackiewicz, M. Waclawek--area and forms of negotiating prices between industry and trade, typewritten copy of the IHWiU, Warsaw, February 1983.

9951
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CENSUS BUREAU OPERATIONS PLAN FOR 1983-1988 OUTLINED

Warsaw WIADOMOSCI STATYSTYCZNE in Polish No 1, Jan 83 pp 26-27

[Article by Zbigniew Jamkowski, M.A. from GUS [Central Office of Statistics] Census Bureau: "Mass Surveys To Be Implemented Between 1983-1988"]

[Text] The Census Bureau survey plan, which constitutes an integral part of the operations plan of the Central Office of Statistics for 1983-1985, must include a more long-term time perspective due to the specific nature of mass surveys, and that is why it extends as far as 1988. Let us recall that the survey plan for the period between censuses, i.e., for 1979-1988 was worked out in 1979 while changes in sociopolitical life and in the nation's economy caused a change in the time required for the implementation of certain surveys, which had already been planned, such as the household census which includes the private farmer as well as the personnel census.

Acceptance of the Census Bureau's program of operations in such a time period is due to the National General Census [NSP] projected for 1988. Previous experience points out that preparations for such a huge undertaking as the NSP must be started suitably in advance and should be carried out in a way which would not have a negative effect on other surveys to be conducted by the Census Bureau at this time.

The present version of the draft plan of mass surveys was consulted from the point of view of the need for these surveys and the time limit for their implementation, with among others, the Planning Commission of the Council of Ministers; the Ministry of Labor, Wages and Social Affairs as well as with the interested departments of GUS.

The plan includes the Census Bureau's own surveys to be conducted in close cooperation with the voivodship bureaus of statistics and the organs of state administration as well as surveys implemented in cooperation with other GUS departments. In addition to the Census Bureau's own mass-scale surveys, which are planned in cycles of varying frequency, supplemental surveys will be conducted by a network of agricultural, horticultural and urban correspondents. The Census Bureau is also planning to participate in other surveys which will be carried out by certain departments of GUS.

The planned surveys may be separated into two groups, namely:

--general censuses and surveys which update the census results,
--other types of census.

We shall now discuss the first group of planned surveys.

The lapse of time from the last National General Census in 1978 results in the constant lack of updating of data which are incapable of being obtained in any other way such as through current reporting. The general census is a complete survey which encompasses the entire country and all of its citizens at the same time. As a result, such a distribution of mass surveys during the period between censuses is projected, which would enable the supply of data for assessment calculations which would update the more significant results of the NSP.

The representative census of the population and of households, the so-called "Microcensus" is the largest survey in this group of the period between censuses; in effect, it is carried out in the middle of this period. During the previous period between censuses, it was conducted in 1974. It is assumed that the upcoming microcensus will be conducted at the end of 1984 and like the previous one, by means of the representative method which will include randomly selected individuals in cities and rural gminas [parishes]. Work is already being carried out on the selection of these individuals. Consideration is being given to, among other things, the possibility of randomly selecting households or apartments, which represents more effective selectivity in terms of merit than the seleciton of, for example, districts. However, the former method is considerably more difficult from the point of view of survey organization.

The purpose of the microcensus will be to obtain current information:

--about the demographic and socio-occupational structure of the population, of households and of families,
--about other populational changes which are indispensable to surveys,
--about the housing conditions of households and families.

The results of the microcensus will be used for:

--the updating of assessments concerning the population,
--the evaluation of the cofactors of professional activity of various populational categories,
--the preparation of the balance [bilans] of work resources,
--work related to the determiantion of the level of the standard, basic income of population groups,
--conducting an analysis of housing conditions in correlation with populational traits.

The census, relating to private farms, will be a repetition of the census which was implemented in 1982,[1] with possible changes resulting from the situation in 1986 at which time this census is to take place.

It is assumed that this census will constitute a subsequent element in the system of demographic surveys which are projected for implementation during the period between censuses. If the system of constant, representative populational surveys[2] will be functioning efficiently by 1986, then it will be possible to abandon this census and obtain the indispensable data within the framework of the system.

The survey of the infrastructure of a particular locality is planned to be conducted at the beginning of 1988 as a survey accompanying the NSP, i.e., in the same fashion in which the previous surveys of this type were conducted in 1970 and in 1978.

The principal purpose of the survey is to obtain specific data about the extent to which cities and localities in gminas are equipped with the basic establishments of the socioeconomic and technical infrastructure. The closely approaching time-limit for the implementation of this survey as compared to the NSP in 1988 makes it possible to tie in its features with the populational and housing data of the census in the cross-section of comparable units and to present them in any territorial systems.

The preliminary [probny] census is an indispensable element in the cycle of preparatory work on the NSP and is usually conducted 1-2 years before the general census. The specific time-limit for the preliminary census is a resultant of the goals and tasks with which this census is faced. Experience points to the need for reexamining those new solutions in the preliminary census, which are projected to be included in the complete census. Reference is made, in particular, to solutions in, among others, the area of the theme of the census, the plan for working out the results and the organization of the census. In the changed socioeconomic situation of the country, this census may have a particularly important significance before the 1988 NSP.

The 1988 National General Census will be conducted in accordance with the long-term practices of GUS and according to international recommendations during a 1-year cycle. The National General Census is the largest statistical survey of GUS and one which supplies indispensable information which would be impossible to obtain by means of current reporting. In view of the significance of this census and its general nature, work on its preparation

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[1]See article by Halina Zaremba entitled, "Spis Ludnosci Rolniczej--Grudzien 1982; Cele i Zasady" [Census of Farm Population--December 1982; Goals and Principles]. 'The National Council, the Economy and the Administration,' No 22 from 1982.

[2]Compare. The deliberations of the GUS Council, "Statistical Information," No 10 from 1982, page 35.

must begin suitably in advance, thus, as early as in 1982, preparatory work was begun in the Census Bureau, which should lead in the next 2 years, to the working out of a preliminary concept for the 1988 NSP pertaining to:

--the range of topics and methodological assumptions on the basis of our own experiences and those of other countries, particularly socialist countries.

--the organizational assumptions of the census concerning, among other things, legislative work, the updating of the network of statistical regions and census districts, the structure of census authorities, the recruitment and training of census counters [rachmistrz], the method of financing the census, etc.,

--the preliminary census conducted for the specification of the goals and tasks of the NSP, which will make it possible to set a strict time-limit and the number and size of territorial units included in the census.

--the organization of compiling the census results with allowances made for variant solutions of the respective stages of work (symbolizing, hole-punching, supervision of collected material, computation of tables), including consideration given to the total or partial decentralization of the worked out material as well as consideration of personal, material and financial resources.

We shall now go on to the discussion of the second group of planned surveys.

Among mass surveys, the personnel census holds a prominent place because it encompasses the entire body of those employed in the socialized economy. This census is conducted in a different fashion than other populational or agricultural surveys since the information for this survey is prepared and compiled by work establishments on the basis of personnel-wage records. The upcoming personnel census will be conducted in accordance with the state of affairs on 31 October 1983. The last census was held in 1977. In principle, this census is organized on the basis of a 4-year cycle. The census will include subject matter concerning professional qualifications as well as the type of work performed, emoluments and commuting. Substantial changes have taken place from the time of the last census in terms of the state and structure of employment according to qualifications. Particularly significant changes affect the condition of wages which was last studied in detail in the 1973 personnel census.

Updated data on the qualificational and wage structure of those employed in the socialized economy are indispensable for many analytical-planning studies and those which have a decisionmaking character in the country's complex socioeconomic situation. It is anticipated that the next personnel census will be conducted in 1987 in accordance with the 4-year cycle.

The agricultural census is an annual survey which has been conducted since 1945. This survey encompasses the problems involving the use of land, areas for sowing and the number of farm animals. In addition, a different subject matter, which changes every year, is surveyed as well, for example:

--water supply on farms,
--farm buildings,
--agricultural machinery and equipment,
--fruit trees and shrubs,
--apiaries and beehives.

Agricultural censuses provide basic data for many consumers on various levels and serve the evaluation of the state of affairs and developmental trends in agriculture, the undertaking of socioeconomic decisions and in addition, they contribute to the setting in order of many matters connected with agriculture, among other things, land records.

The agricultural census has been the subject of particular interest on the part of GUS during the last period because of the frequency with which it is held and the considerable difficulties, which are beginning to outline themselves with increasing sharpness, in acquiring census counters and other people who work on behalf of its implementation as well as due to increasing costs. This census, which constitutes an important element in the system of agricultural statistics, requires new organizational solutions and changes in the subject matter and methods of surveying.

The work which is currently being carried out in this area mainly concerns:

--replacing in the coming years, complete censuses with representative censuses; conducting assessments of surface areas for sowing as well as completing census data with available reporting;
--assuring data in the existing territorial cross sections with a changed method of obtaining data;
--organizational changes dealing with the accuracy of the census deadline, spreading out in time the collection of information about sowing and the acquisition of census counters;
--taking advantage of various forms (organizational and technical) of census taking, for example, census conducted by village administrators, self-census and census points in administrative offices.

As can be seen from the presented survey plan, work on 13 mass surveys will be held during the 1983-1988 period in the GUS Census Bureau. These surveys will be differentiated both in terms of organization as well as in terms of the subject matter and the method of compiling the results.

The above-mentioned number includes the annual agricultural censuses. As far as the frequency with which they are conducted--the final decisions will be made in the future.

9853
CSO: 2600/654

DRACONIAN MEASURES ADOPTED TO STIMULATE AGRICULTURE

Budapest HETI VILAGGAZDASAG in Hungarian 23 Apr 83 p 11

/Text/ At the end of March the Romanian State Council brought several decrees having the binding force of law. In order to stimulate animal husbandry, decrees concerning sales regulations of agricultural products contain draconian measures. Their goal is better supply for the population.

Since the end of March consumers have been able to study the huge price lists on Romanian markets. Authorities have established a maximum price for market goods and they inflict severe measures for evasion of fixed prices. The influx of goods to the markets is relatively good now in Bukarest. The individual farmer is obviously not kept from marketing by the setting of price ceilings. Actually, from time to time, they offer some vegetables even below the ceiling price.

The decrees with binding force of law were approved by the State Council on 28 March. They concern agriculture as well as the setting of maximum prices for market goods. One of the decrees is meant to stimulate animal husbandry, while the other two are attempting to introduce a greater order on the sales level than the one in existence so far. These draconian decrees were brought by the State Council a few days after the great national assembly had approved the report of the investigation by high ranking party and state leaders regarding the recent large scale death of livestock, and the disregard of veterinary standards in several counties.

The investigation report indicates that numerous midlevel leaders were forced to reimburse some of the damage. At present they are under legal investigation. Several county and ministry chiefs were warned and given probationary terms to liquidate the errors committed in animal husbandry. The exact extent of livestock losses and incurred damages were not reported. From the tone of the report and strict measures one can conclude that there were serious omissions in five counties. According to the new regulations, i.e. the modifications of the regulations by the State Council, the producer will receive ½ a lei price-premium per kg for animals weighing more than 400 kg. For each calf cared for half a year they will receive 400 leis as a premium. They are raising the income of animal health service experts so that the animal caretakers are getting 2000-5000 leis per year more than now. The stimulatory regulations have increased the budget expenses only by about 1 billion leis, which according

to the new regulation will be modified soon. Consequently, they do not wish to increase the consumer prices for food, they even admit that the earlier price increases were unnecessarily high.

Primarily, they want to stimulate agriculture and animal husbandry in the form of immediate support by the state. Accordingly, private producers, when selling their goods, must adhere to the prices determined by local councils. They want to deal more rigorously with the problem of slaughtering as well, i.e. emergency and "illegal" slaughters. (In Romania animals can be slaughtered only with an official permit.) The sale of meat by self-employed people is still forbidden. The militia will have a big role in maintaining the order--they will have to uncover every offence and illegality. Severe penalties will be given for profiteering as well and such activity will be considered counter-revolutionary. Slaughtering on the black market will be punished by up to 1 year in prison, confiscation of the meat and penalty up to 10,000 leis. Speculators can be punished by up to 5 years in prison and with a fine of up to 3000 leis. Thus, these are draconian measures with a final goal of improving the supply.

9968
CSO: 2500/250

BETTER LABOR ORGANIZATION AIMED AT GREATER OIL PRODUCTION

Bucharest REVISTA ECONOMICA in Romanian 18 Mar 83 pp 1,2

[Article by Dorin Constantinescu]

[Text] A particularly significant moment was recently marked on the economic calendar at the quarter's close, namely the working conference with the petroleum industry's leadership and other workers. The conference was organized at the initiative of the Secretary General of the Party and President of the Republic Comrade Nicolae Ceausescu.

The working conference with petroleum employees was held not long after the dialogue with the mining and geology leadership and specialists and it had the same goal--to accelerate the increase in the energy and raw material national base. It documented our party and state's consistently democratic policy, one deeply imprinted on all structures and on all Romanian economic and social echelons; a policy that bases any major decision, any broad interest activity and all development policy on widespread consultations with the workers, who are the creators of material and moral goods, proprietors and beneficiaries.

The debates centered on matters relating to an earlier fulfillment of the goal set by the Twelfth Congress to ensure the country's energy independence by the end of the present 5-year plan and to complete the special programs adopted by the National Party Conference to increase gas and oil production by 1985 above 5-year plan levels. These are programs which were drawn up, implemented and totally integrated with those approved earlier to increase the final recovery factor of oil from the oilfields, drilling and pumping of oil from the Black Sea continental shelf and from deep wells, and the return of gas. We intend to obtain a 5 percent production increase over plan provisions for the three years together so that by 1985 we will reach at least 15 million tons of oil and 8 billion cubic meters of gas.

Party Secretary General Nicolae Ceausescu's speech to the conference was enthusiastically received by all the workers in this important sector of the extraction industry. The speech once again pointed out with scientific clarity and realism the necessity to develop the country's hydrocarbon production as a condition of Socialist Romania's economic and social progress and it spelled out the problems which this imperative produces. It suggested solutions for them, pointed out that our petroleum workers' rich work experience

must be constantly widened through the assimilation and application of current scientific and technical successes through an increase in professional understanding and through a production and work organizational plan that fits the new conditions and meets the demands so as to increase all activities' economic efficiency. There was a reaffirmation of the directive formulated at the CC RCP enlarged plenum in June 1982 to tie workers' pay and earnings more closely to qualitative and quantitative achievement of plan goals so as to stimulate production with more judicious management of all reserves. As Comrade Nicolae Ceausescu pointed out in his speech to the meeting, "In petroleum. we have a strong detachment of workers with long revolutionary traditions. We have highly qualified workers, engineers, and technicians, in other words, a powerful force which can--which must--quickly overcome shortcomings and negative situations, ensure work's enhancement and raise all sectors' activities to meet the great demands levied by the party and the people."

Maximum Use of Drilling and Pumping Platforms

Given the conclusions of the conference's exacting analysis and the directives and tasks set by Comrade Nicolae Ceausescu, the Ministry of Petroleum and the workers at its subordinate units received an extensive list of activities which must be undertaken immediately to overcome the shortcomings that cause delays in the production plan for the completed portion of the 5-year plan. These activities aim to employ all possible means to increase extraction volumes by fully using and expanding production capacity, by ensuring the necessary workforce--especially drillers--and by improving their professionalism, by improving organization and leadership, by employing incentive pay and and by strengthening order and discipline at every worksite.

There is no acceptable justification for the situation created by idling a large number of wells while waiting for operations tied to production tests to be carried out, for capital repairs and for intercessions. This has crimped crude oil production capacity at a time when, as a direct result, our national economy is encountering difficulties in the supply of petroleum products. By concentrating the efforts of all unit-level responsible elements, these capacities must be put back into operation as quickly as possible in order to complete our party secretary general's order that daily average production rise 50 percent above last year's level. Regarding drilling, that fact that for the first 2 months of this year the overall plan has been met cannot be totally satisfactory as long as the planned figures for two of the sectors are not met. This is the case for deep wells which hold considerable production potential and for research--for production and for applying new methods to increase the recovery factor. We note that modern recovery procedures are used in above 73 percent of all oil fields and petroleum structures in operation; there is still room to increase the obtained results--which requires and creates the conditions necessary for testing the improvements brought on by research. We must use the drilling rigs more and we must organize new work formations to meet the work figures established for every drilling-pumping trust.

The party's secretary general demanded we take decisive action so all units and every well work efficiently: "We must fully understand that if most of

wells we have worked properly--even those with low output--we would quickly realize the targets for this year's daily petroleum production."

This imperative also clearly emerges from the analysis made recently at a CC RCP Political Executive Committee meeting. For petroleum industry trust, oilfield and brigade leadership councils and collectives, a top priority is to take decisive measures to best use production capacities, to increase the use of specialized installations, machines and tools, to effect current and capital repairs on time and with good quality and to improve used parts' maintenance and reconditioning.

During this period, the trusts and oil wells' leadership collectives must give priority attention to:

--implementing and extending new processes and methods, especially thermal, to retrieve oil that cannot be extracted by current methods and creating the technical-technological base to rapidly raise the final recovery factor to at least 90 percent by 1985;

--this is achieved through the widespread use of automatic supervision by the dispatchers of the operation of the wells in each oil field and through extension of the controlled system of collecting and separating the crude oil in the oil tank farms which avoids evaporation of the light components;

--increasing the capacities and modernizing the benzene and ethane removal installation and the transport and gas distribution installations, and obtaining high returns from related gases;

--improving drilling and extraction production organization activities so that the human and technical-material potential is used as efficiently as possible to fully achieve crude oil, gas, gasoline and ethane plan goals.

The Brigade--The Basic Unit in Production and Drilling Activity

In this area, the days which preceded the meeting were marked by major organizational activity implemented throughout the sector, an activity conceived and achieved through the party's secretary general's directives. Its aim was a restructuring to strengthen the basic units where real production is carried out, so as to ensure the technical leadership necessary for these units and to bring the leadership closer to production by eliminating intermediate organizational levels (the sections). It also sought to provide organizational consolidation of territorial units--especially oilfields which were given increased powers and responsibilities. The concept achieved through these measures offers ample promise for future improvements of this type in other sectors of the economy, when adapted to their specific needs. The intent is to increase problem solving capacities at the production site, to reduce the impact of involved bureaucratic conventions, to individualize responsibilities and to strengthen workers' self-supervision and self-management.

In the new formulation, the pyramidal structure is as follows:

--The brigade in two areas of activity:

A. The petroleum production brigade (directly subordinate to the oilfield) organized and functioning on the principle of economic management, is formally named in the plan and is fully responsible for the entire oil and gas extraction process. This includes: carrying out production, supervising wells, raising the final recovery factor, collecting and separating crude oil and gases, putting wells into operation, taking the necessary measures to maintain them and to effect repairs (with its own resources or together with the agricultural mechanization centers) and attending to the mechanical and energy upkeep of equipment and installations in its inventory. A brigade can be large, medium-sized or small, depending on the number of wells, the planned production volume, the extraction system (eruption, gas lift or pumping) and the territorial dispersal. It is headed by an engineer (appointed as a section chief) who is assisted by shifts of engineers and subengineers (appointed as deputy section chiefs), with the necessary number of masters beneath them. The brigade organizes its activities and workforce so that it is in continuous operation 7 days a week, with three shifts. Where the creation of a brigade cannot be justified (where there are a few, isolated wells) a work formation with three shifts is established headed by a master and operating under the same principles and attributes as the brigade;

B. The drilling brigade has a similar organization and tasks in line with its particular activity. It is formed in accordance with the complexity of operations, namely the depth to which the wells are planned (shallow depths--four to six wells to a brigade; deep--two to four wells; and very deep--one well to a brigade.)

The brigade, upon whose work the achievement of the plan depends must, as the party's secretary general pointed out, constitute the basic production unit. "Massing the workforce in the brigade, passing responsibility to it and tying the brigade to production--with all the attendant problems--must bring about a better solution of the complex problems linked to petroleum extraction."

The oilfield is set up as an enterprise (with a juridical personality); it is established by the plan and functions on the principle of economic and financial self-management. Within it are brigades as well as workshops or sections which perform centralized functions for the entire zone of activity (capital repairs to equipment, mass construction and installations, construction at the worksite itself and so on). As the party's secretary general pointed out, "the oilfield must perform its mission better to coordinate and solve the more general problems so that the brigades function better." To this end, compared with the tasks and areas of competence seen up to now, the oilfield takes on new attributes in such fields as : investments, planning, geology, introduction of new technology, technical-material supply, finance accounting, etc., which gives it greater autonomy and more elbow room to resolve problems of plan fulfillment. Depending on specific tasks, there are:

A. Petroleum production oilfields--there are three types (large, medium-sized and small) depending on the number and territorial location of the wells and the production volume;

B. Drilling oilfields--there are two types (large and small) depending on the number and depth of the wells.

To organize activity better it was decided that five new oilfields be established in both the production and drilling sectors so that each oilfield operates, territorially, within a county.

The drilling-extraction trust coordinates the activities of both types of oilfields and is entrusted with the economic activity carried out. Among the attributes which the six existing trusts have are providing the specialized assistance necessary for achieving planned physical production and applying modern methods and technology; control over the overall operations of the oilfields, especially in meeting drilling schedules, and testing and exploiting new wells across the entire work structure. The trust monitors the achievement of the quantitative and qualitative production indicators by each oilfield separately and by the trust as a whole; it ensures (together with the sector's research and design institute) that programs to raise crude oil and gases recovery levels are drawn up and applied and that the investment and drilling documents for oilfields that work in the same geological structures are drawn up and approved. The trust, using its own workforce (worksites or groups of worksites), does the construction-installation work pertaining to the oilfields it coordinates.

At all the levels, the entire workforce is engaged and stimulated through material cointerest to achieve the plan's tasks, especially the physical ones. Thus the brigades work with their entire labor force unified, with pay for those in production being established by production volume and that for drillers in accordance with the daily metric amounts achieved and with the meeting of well completion target dates (for drilling for geological research, bonuses are paid in accordance with the reserves discovered--crude oil, gases and other useful minerals).

Making the most of the advantages of this organization depends upon its complete implementation in form and content, and on rapid application of the details regarding attributes, relationships, individual responsibilities and the prescribed functioning of the entire mechanism.

The directives and urgings in the party secretary general's speech at the recent working conference stirred a strong competitive sensation among oil workers which has been reflected these past days in significant production increases. The tireless application of the crude oil and gas production increase program for energy needs and more importantly for maximum industrial use of this resource will contribute to the realization of the goals established by the National Conference Party so as to accelerate the country's socio-economic development and to raise everyone's living standards.

12280
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STRATEGY FOR LONG-TERM DEVELOPMENT OF ENERGY

Belgrade BORBA in Serbo-Croatian 24, 25 Mar 83 Enclosure

[First installment of strategy paper prepared by the Energy Subgroup of the Working Group for Drafting the Long-Range Economic Stabilization Program of the Commission of Federal Social Councils for Problems of Economic Stabilization]

[24 Mar 83 Enclosure pp 1-12]

[Excerpts] Within the Commission of Federal Social Councils for Problems of Economic Stabilization and within the Working Group for Drafting the Long-Range Economic Stabilization Program a special subgroup consisting of Hrvoje Pozar, member of the academy (director); Nikola Bilcar, engineer (secretary); Dr Milan Copic; Zlatko Hill, economist; Halit Malici, engineer; Dr Lazar Ljubisa; Dr Muris Osmanagic; Moma Simonovic, professor; and Col Vladan Sljivic, developed a strategy for development of Yugoslavia's fuel and power industry aimed at facilitating the country's future successful economic and social development along with reduced energy imports by taking advantage of domestic sources.

The subgroup examined possible directions of action toward optimum energy use, which in turn contributes to reduction of imports and reduction of the country's energy dependence thereby. A task of that kind necessitated a sizable body of previous studies and research. Although the body of research we have done is not small, it is still inadequate, and the subgroup took as its point of departure what was learned and known from our own and world experience. The present document represents the result of the subgroup's work; it was drafted on the basis of suggestions and recommendations of the commission (28 October 1982) and the editorial board (28 December 1982 and 22 February and 17 March 1983).

The strategy of Yugoslavia's long-range energy development, as a separate document within the long-range economic stabilization program, is being sent to all participants in the work of the councils and is being presented for examination of the public at large so that appropriate activities can be

undertaken to carry it out. It is particularly emphasized that the importance and complexity of this problem area require that appropriate scientific research be conducted continuously as the strategy for Yugoslavia's long-range energy development is carried out.

Introductory Remarks*

Proceeding from the fact that energy is the basis of economic and social development and mindful of the energy reserves in the country. The need to import energy, and the difficulties that involves, the level of the country's energy dependence, the problem of substitution and in general the complexity of energy supply, [the subgroup has] in this document based the strategy for development of the fuel and power industry in the country on the following basic foundations:

i. maximum development of domestic sources of energy--coal, petroleum, gas, water power, nuclear energy and firewood;

ii. optimum use or conservation of energy;

iii. the necessary importation of energy, and

iv. economically justified use of alternative forms of energy.

A comparison of energy consumption in Yugoslavia with other countries in the world, forecasts of consumption in Yugoslavia up to the year 2020, development of the production of primary domestic sources of energy, the energy balance, socioeconomic relations, and measures and actions to ensure energy supply and optimalization of consumption have been dealt with in the sections which are to follow.

Accomplishment of the strategy for development of the fuel and power energy so conceived will depend in large part on its further elaboration for application (studies and surveys), but to a far greater degree on the means of attaining the end--the prices of the particular forms of energy which (on the basis of the necessary analyses) ought to be such (with respect to price relations) as to implement the development strategy which has been outlined, but also such as to furnish resources for development. Insofar as that cannot be achieved, the necessary resources must be provided in some other way.

* This text of the strategy for Yugoslavia's long-range energy development does not contain all of the documentary material (tables and graphs), which will be published as a whole by the "Informator" publishing organization in Zagreb.

Section One. Energy Consumption in Yugoslavia in Comparison With Other Countries

1. Per Capita Energy Consumption and Growth of Consumption

Per capita energy consumption is an indicator of the intensity of energy consumption. With respect to this criterion Yugoslavia is at the bottom of the list of European countries. Only Greece and Portugal have lower consumption than Yugoslavia. In 1979 per capita energy consumption in Yugoslavia was only 18.6 percent of consumption in the United States and 35.2 percent of consumption in FRG.

A comparison of per capita energy consumption and the growth of energy consumption in the period for 1970 to 1979 shows that average annual growth of consumption is dropping as consumption increases. Certainly the economic recession has had an impact on relations in that period. The dependent relationship between per capita energy consumption and the growth of energy consumption is still more evident in a period of economic prosperity such as occurred between 1960 and 1973.

2. Structure of Primary Energy

The structure of primary energy consumption has undergone essential change over the last 30 years. The general characteristic is a considerable drop in the share of solid fuels and a considerable increase of liquid fuels. At the same time there has been a considerable increase in the share of gaseous fuels and hydropower, although their share has not achieved a high percentage.

The general tendency in all countries is a slowing down of the decrease of the share of solid fuels in energy supply in the period since 1973, a process which was very marked between 1960 and 1973. Yugoslavia is among the countries in which the share of solid fuels decreased the most in the period between 1960 and 1973, but also among the six European countries in which there was the greatest decrease in the share of solid fuels in energy supply in the period from 1973 to 1979. Although substitution of coal for liquid fuels is no simple matter, there are still countries in which the share of solid fuels in energy supply has increased since 1973.

Yugoslavia is among the countries with low per capita consumption of liquid fuels. Per capita liquid fuel consumption in the United States, West Germany and the world average are as follows:

Liquid Fuels	United States, %	West Germany, %	World, %
Gasoline	8.6	30.3	79.2
Diesel fuel	22.5	16.8	105.0
Heating oil	48.9	75.9	151.7
Liquid fuels--total	19.1	33.1	107.0

Fuel oil consumption in Yugoslavia is very high compared to the very advanced countries and the world as a whole, while consumption of gasoline and diesel fuel is modest.

Yugoslavia is among the countries with the largest increase in the share of liquid fuels in the structure of forms of energy consumed. In most European countries, that is, there has been a drop in the share of liquid fuels in the period from 1973 to 1979, but in several countries this decrease also occurred in the period from 1970 to 1973. The increase in the share of liquid fuels in Yugoslavia is a consequence of the relatively large growth of consumption in the periods from 1970 to 1973 and from 1973 to 1979. In the period since the higher prices of crude petroleum the growth of consumption of liquid fuels has been so great as to be one of the highest among the European countries.

This relatively large growth in consumption of liquid fuels is both a consequence of the relatively low per capita consumption relative to other countries and also because of the reduction [could be misprint for "lack"] of effective actions which would have slowed down the growth of consumption.

3. Heating Oil Consumption

Heating oil consumption, which of all the petroleum derivatives can most easily be replaced by other forms of energy, is a separate problem. In many countries the share of heating oil in energy supply was very high up until 1973. That share has dropped in the period since 1973, but that decrease also commenced after 1970.

In Yugoslavia the share of heating oil in energy supply has been growing steadily, increasing from 14.3 percent in 1970 to 21.1 percent in 1979, which means that more than a fifth of the necessary energy was obtained by burning heating oil. In a majority of the European countries by contrast, the share of heating oil has dropped, especially since 1973. This has occurred even in countries where the share of heating oil is high (France, Italy, Sweden, Denmark), as well as in the countries with relatively low share of this fuel in the energy supply (United States, West Germany, Switzerland).

Among the European countries Yugoslavia is the country with the highest increase in the share of heating oil in the period from 1973 to 1979. This increased share is a consequence of the very high growth of consumption of heating oil. Yugoslavia, then, is among the countries with the highest growth of consumption of heating oil, especially in the period between 1973 and 1979.

4. Supply of Domestic Sources of Energy

The general tendency is toward increased supply from domestic sources of energy. Considerable results have been achieved in several countries (Norway, Holland, Great Britain) after discovery of deposits of petroleum and natural gas in other countries. Dependence on imported energy has been reduced through better utilization of domestic sources (Greece, Sweden, Switzerland and Spain).

Yugoslavia is not among the countries in which much has been done since 1973 to reduce dependence on imported energy. The truth is that today we meet slightly less than two-thirds of the demand with domestic sources of energy, but some 10 years ago it was possible to meet about three-fourths of energy consumption with domestic sources of energy.

So long as the prices of crude petroleum were low (the period before 1973), that kind of policy was probably justified. However, the ever smaller supply from domestic sources since 1973 can hardly be defended. In our situation there were basically two possibilities for increasing supply from domestic sources of energy: increasing the mining of coal and increasing the production of petroleum and natural gas. Certainly this would have required both time and resources.

Little has been done to increase the mining of coal. There has been an increase in coal production by the open-pit method, while the underground mining of coal has gradually decreased. On the other hand coal production has been dependent upon the growth of coal consumption in thermal electric power plants, while other consumers have been oriented toward other forms of energy. Reduction of the underground mining of coal, which is the method of mining brown coal and the better-quality lignite, prevented the substitution of coal for other forms of energy. That is, that substitution is possible if the coal has a fairly high heating value; this is both because of the conditions of combustion and achievement of sufficiently high temperatures, but it also has to do with shipping costs. Insufficient investments and the unfavorable economic status of the mines, along with the worsening of the mining-geological conditions have worked toward a drop in the production of the better grades of coal.

Nor is the situation any better with respect to the production of crude petroleum and natural gas. When we examined the growth of consumption of crude petroleum (average annual growth 7.4 percent), the growth of production of 3.76 percent over the period from 1973 to 1979 shows that this is another of the causes of the smaller and smaller supply from domestic sources of energy. It can be estimated, however, that the growth of petroleum consumption in the period since 1973 could have been greater if the existence of the Equalization Fund had not prevented the financing of explorations and had not slowed down development of deposits already discovered. Aside from that, because of difficulties in providing the foreign exchange to repair installations, to purchase equipment and chemicals for application of secondary methods of oil displacement, equipment for gas lift recovery, deep-well pumps and the like, it is not possible today to achieve that production of petroleum which otherwise could have been achieved.

Fluctuations in natural gas production are not exclusively the consequence of natural production capabilities, but also because of uneven imports (smaller purchases of imports are usually made in the winter months than in the summer, when consumption is also smaller, which tends to stifle domestic production).

There is certainly good reason to put the question of where the causes are of this kind of development of energy over the last 10 years or so. On the one hand it is a fact that energy balances have envisaged a certain reorientation in energy consumption, but the projections contained in those balances were ... not accompanied either by economic policy measures or concrete action. Thus the problem was not solved of investments to increase the mining of brown coal and better-grade lignite either by pooling capital or in any other way, nor was the problem solved of resources for intensive exploration for petroleum and gas. Nor do we know what the actual possibilities are for conversion of

boilers and other installations in industry (in cement plants, for example), yet that conversion should have been done 6 or 7 years ago, and so on.

5. Trends in Energy Consumption in the Most Highly Developed Countries

According to figures of the European Economic Commission ("Problems of Energy and Cooperation Concerning Energy in the EEC Region," ENERGY, R20, 23 October 1981), the following growth of energy consumption is anticipated:

Area	1980/1990	1980/2000
Western Europe	2.65%	1.84%
Eastern Europe	2.11%	1.84%
USSR	3.22%	1.97%
United States	1.24%	1.42%

so that per capita energy consumption in kilograms of coal equivalent would be as follows:

Area	1980	1990	2000
Western Europe	4,467	5,465	6,180
Eastern Europe	5,291	6,021	6,443
USSR	6,690	8,396	9,332
United States	13,370	13,958	14,842

A considerable change in the structure of energy consumption is envisaged in all areas.

A reduction in the share of liquid fuels is thus anticipated in total energy consumption (from 42.0 percent in 1980 to 27.1 percent in the year 2000 for the entire region), but accompanied by a slight reduction in the quantity of liquid fuels consumed (in the year 2000 consumption would amount to about 95 percent of liquid fuel consumption in 1980).

The share of water power will not undergo substantial change, although new hydroplants will be built in all areas.

The share of other forms of energy (firewood, wood scrap, charcoal, oil shale, bituminous sand, peat, geothermal energy, direct solar radiation, biomass other than firewood and wood scrap, and energy from the wind, waves and tides) is very small, and in the year 2000, according to the estimates mentioned, it will amount to slightly less than 4 percent. It is calculated that direct use of solar radiation could account for between 1 and 2 percent, and energy from the wind, waves and tides only between 0.1 and 0.2 percent of the demand.

6. Correlation Between Energy Consumption and the Social Product

The correlation between energy consumption and the per capita social product was calculated on the basis of data concerning the social product worked up in statistical yearbooks (on the basis of the 1972 value of the dinar) and on the

basis of data on the social product expressed in U.S. dollars at 1975 value (Vinski, "Kretanje drustvenog proizvoda svijeta od 1910. do 1975. godine" [Trend of the World Social Product from 1910 to 1975], Zagreb, 1978). Data on energy consumption published in statistical publications of the United Nations were used for both computations.

According to figures on the social product in our statistical yearbooks, the following correlation is obtained for the period from 1970 to 1979:

$$E = 294.3 + 109.6D \quad (1)$$

in which E is per capita energy consumption in kilograms of equivalent coal and D is the per capita social product in 10^3 dinars. Regression analysis shows that a very high correlation coefficient (0.986) is obtained.

If we take into account the per capita social product in the European countries, the USSR and the United States, according to the data in the book of Professor Vinski already mentioned, and per capita energy consumption in 1950, 1960, 1970 and 1975, we get this correlation:

$$E = 404.9 + 1,1367D \quad (2)$$

in which E is per capita energy consumption in kilograms of equivalent coal and D the per capita social product in dollars.

7. Energy Necessary To Achieve the Social Product

If the energy consumed is divided by the social product, we get a figure on the necessary energy (kilograms of equivalent coal per unit of the social product, in dollars).

There are considerable differences in the necessary energy per unit of the social product, since the necessary energy depends on the structure of industry and then on the country (the USSR, the United States, Great Britain) in which the metallurgical and chemical industries are highly developed, that is, industries which are intensive energy consumers and therefore have high energy consumption per unit of the social product. Countries by contrast which have a predominantly manufacturing industry (Switzerland, for example), have low energy consumption per unit of the social product. There are on the other hand activities which require less energy per unit of the social product (for example, tourism, fruit growing, market gardening), so that countries in which these activities are developed have lower energy consumption per unit of the social product (France--tourism and small landholdings, Switzerland and Austria--tourism). A high share of hydropower reduces total energy consumption, since in hydroplants there is better utilization of primary energy than in other types of power plants. That is why the necessary energy per unit of the social product is relatively low in Norway (the share of hydropower in generating electric power was 99.9 percent in 1975), Yugoslavia (48.2 percent), Sweden (71.6 percent), Portugal (60.0 percent) and Switzerland (78.2 percent).

Energy consumption per unit of the social product is also affected by optimum energy use, but also by energy consumption for nonproductive purposes (everyday comfort, private travel, heating entire dwellings, and the like).

At the beginning of a country's economic development energy consumption per unit of the social product is usually relatively low, since at that time the social product, which is also small at that point, is achieved with low consumption of energy (agriculture, the crafts and trades and small-scale industry). With gradual development (construction of industry and the rise in the standard of living) there is an increase in the consumption of energy per unit of the social product, and when a certain level of development is achieved, that consumption reaches a maximum. After that consumption slowly drops.

Some countries achieved that maximum before 1950 (Czechoslovakia, GDR, United States, Great Britain, Belgium, West Germany, France). These are the most advanced countries. Others reached the maximum in the period between 1940 and 1975, among them Yugoslavia.

Certainly the rise in petroleum prices in 1973 had an impact on reduction of energy consumption per unit of the social product in the period since 1970.

Energy consumption per unit of the social product in Yugoslavia is among the lowest in Europe. Thus the relatively low consumption of energy per unit of the social product can be explained by the relatively high share of hydropower, the considerable share of agriculture and tourism in the social product, as well as the relatively low consumption of energy for nonproductive purposes.

8. Electric Power Consumption in Yugoslavia Compared to Other Countries

The intensity of electric power consumption is best shown by specific per capita consumption. That intensity in Yugoslavia is not high compared to the countries in Europe. Only Greece and Portugal among the European countries considered have lower consumption than Yugoslavia.

It is evident that the rise in electric power consumption is greater when the intensity of consumption of that form of energy is lower. That dependence holds true in spite of the economic stagnation which has had an important impact on total energy consumption.

9. Trends in Electric Power Production

According to the estimate of the European Economic Commission already mentioned (ENERGY/R20, 23 October 1981), we should anticipate a larger growth of electric power consumption than total energy consumption, and it is calculated that by the end of the century electric power consumption will almost double in the most advanced part of the world.

That calculation assumes a considerable change in the structure of electric power production with respect to the form of energy used to generate it. The greatest change should be anticipated in the inroads made by nuclear energy in generating electric power, so that by the end of the century, according to the

predictions, nearly 30 percent of electric power will be generated in nuclear power plants in the most highly developed countries (all of 42 percent by the end of the century in western Europe). Even though those hydropower installations which are most economical have already been built in that part of the world, the share of the output of hydroplants in total electric power production will not decrease to any considerable extent, which indicates the justifiability of building even the less economical hydroplants. The use of liquid fuels to generate electric power, as indeed should be anticipated, will drop by several percentage points. This also applies to the use of natural gas in all regions, except the USSR, which will become the largest producer of natural gas. Reduced use of natural gas to generate electric power is brought about by the orientation of that fuel toward meeting other needs.

10. Energy Needed To Generate Electric Power

A part of the total energy needed to supply an area is consumed in generating electric power. Since electric power consumption rises faster than consumption of total energy, there is a steady increase in the share of energy needed to generate electric power. Between one-fourth and one-half of a country's total energy needs go for generating electric power, which depends on the share of hydropower and on the ratio in consumption between electric power and total energy.

The share of the electric power industry in consumption of total energy will increase in the future, which can indeed be seen from development up to this point and which is obtained from data on consumption of total energy and consumption of electric power in the most highly developed countries. If, that is, we examine as a whole the regions of Europe, the USSR and the United States, it is clear that the following percentage of total necessary energy will be needed to generate electric power:

1990	44.7%
2000	49.2%

Accordingly, the electric power industry will in future become the largest consumer of primary energy, which should be taken into account in planning development of the fuel and power industry.

11. Correlation Between Electric Power Consumption and the Social Product

Along with the correlation between total energy consumption and the social product, the correlation was determined between electric power consumption and the social product, and that once on the basis of data for Yugoslavia in the period from 1970 to 1979 and the second time on the basis of conditions in the European countries in 1950, 1960, 1970 and 1975, according to the sources already mentioned.

We get the following correlation from the figures for Yugoslavia:

$$E = -694.6 + 190.5D \qquad (3)$$

in which E is per capita electric power consumption in kilowatt-hours and D the per capita social product in 10^3 dinars.

The following correlation is obtained for conditions in the European countries:

$$E = -404.9 + 1.1367D \qquad (4)$$

in which the per capita social product is given in U.S. dollars. Were we to compare the growth of electric power consumption determined from the relations (3) and (4), we would get practically the same results. It can accordingly be concluded that the correlation established between the figures for Yugoslavia represents a rather reliable basis for estimating future electric power consumption on the basis of the growth of the social product.

12. Electric Power Needed To Achieve the Social Product

Analogously to the total energy needed per unit of the social product, it is possible to determine the electric power needed per unit of the social product.

The general tendency is an increase in electric power consumption per unit of the social product, since more and more consumers are turning toward electric power either for manufacturing processes, especially those which have been automated, or as a form of energy for increased convenience and entertainment (household appliances, increased intensity of illumination, telecommunications, electric radiators for heating, direct heating in the transitional period, etc.). It is interesting that even in countries with high per capita electric power consumption (Norway, Sweden, United States, Finland) there has been neither a decrease in per capita electric power consumption nor a drop in electric power consumption per unit of their product.

Very high electric power consumption per unit of the social product occurs in countries with a high share of hydropower (Norway, Sweden and Finland), where electric power is used in large amounts for heating. Certainly electric power consumption per unit of the social product depends on the structure of industry, on the level of consumption in households, and on the availability of other forms of energy (natural gas above all).

We have had a development similar to that in other countries, although the electric power needed per unit of the social product is relatively low.

Section Two. Estimate of the Growth of Energy Consumption

1. Variants of the Growth of the Social Product

Since there is no long-range estimate of the social product, nor is it possible to ascertain it with any great confidence, especially when it comes to a long-term prediction which in this case covers four decades, the growth of energy consumption has been examined under three assumptions concerning the development of the social product (Figure 2.1). Variant V3 assumes a small growth of the social product, not greater than 3.5 percent over the entire period under consideration. That variant might be called the pessimistic one.

Variant V4 assumes a 4.0-percent growth of the social product in the period immediately after 1985. After 1990 the anticipated growth of the social product gradually drops. That variant might be called the middle alternative. Variant V5, which might be called the desirable variant, assumes a gradual rise of the growth rate of the social product at the outset, which in 1990 would reach the level of 5 percent per year, but with a gradual reduction up to the end of the period under consideration.

It must be emphasized, however, that the growth rates of the social product envisaged are considerably lower than have been achieved in the past. Yet today it is felt that in future it will not be able to achieve such growth rates because of the altered conditions in the world economy.

Taking into account the assumed growth rates of the social product, it is easy to compute the per capita social product (Table 2.2) as well as the gross social product (Table 2.2) by multiplying by the anticipated size of the population.

Certainly the growth of the social product is not the only criterion from which to determine future energy consumption. Energy consumption might be forecast much more confidently if there were forecasts of the industrial structure, that is, if forecasts existed for the development of the industrial branches and if we knew the specific rates of energy consumption per unit of output. That kind of forecast, however, is much less reliable than a forecast of the gross social product. Forecasts are always less reliable when they are based on partial forecasts, as proven by experience up to now. Frequent attempts have been made in the past to forecast electric power consumption on the basis of forecasts of development of the consumption of individual work organizations. This proved to be considerably less realistic than overall forecasts, since the partial forecasts yield considerably higher values than the global forecasts.

Aside from that, industry has a direct share of at least 40 percent in total energy consumption. The remainder of the energy is consumed by small consumers (households, the trade sector, the crafts and trades, the administration, etc.), transportation, agriculture, construction and the timber and lumber industry. The consumption of a majority of these consumers depends only very little on the structure of industry, but it depends considerably on the social product.

We should, of course, mention that today long-range projections of development of the fuel and power industry are based in other countries as well on estimates of the development of the social product, since it is felt that structural changes can be carried out only gradually.

The quantifications set forth in energy balances show that for all the variants of the growth of the social product taken under consideration there is a single strategy of long-range energy development, while the differing growth rates of the social product affect only the dynamic pattern of development.

2. Energy Needs

By means of the relationship (1) in the first section and the calculated per capita social product it is possible to compute the per capita energy need for the entire period under consideration as well as the total energy needed by multiplying by the population (Table 2.3).

If we compare the growth rate of per capita energy consumption (Table 2.3) and the growth rate of the social product (Table 2.1), we get the values of those two growth rates referred to as the elasticity coefficient, which are as follows:

Year	V3	V4	V5
1980/1985	0.873	0.874	0.874
1985/1990	0.889	0.893	0.983
1990/1995	0.903	0.908	0.912
1995/2000	0.920	0.925	0.927
2000/2005	0.929	0.934	0.940
2005/2010	0.939	0.944	0.952
2010/2015	0.950	0.955	0.960
2015/2020	0.955	0.959	0.966

Accordingly, the elasticity coefficient of growth as consumption increases, first of all because of the drop in the level of efficiency of the energy system, which occurs because of the more rapid growth of consumption of electric power than consumption of total energy. That is, efficiency in thermal electric power plants is very low, so that a rapid increase in the output of electric power eliminates the efficiencies which are possible in the use of energy.

As an indicator of the relation between energy consumption and the social product one can introduce a quantity between the anticipated energy needed (Table 2.3) and the social product (Table 2.2). That quantity, which is given in Table 2.4, shows that a steady drop in energy consumption per unit of the social product is envisaged, which shows that the change in the industrial structure was taken into account (development oriented toward industry with a lower energy consumption) as was more optimum energy use. In examining these figures we must take into account the fact that per capita energy consumption is very low in our country as compared to the advanced countries, so that the energy needed per unit of the social product is also relatively low compared to other countries.

Forecasts of energy consumption in Yugoslavia in the year 2000 and the year 2020 are compared with actual consumption in the European countries. It is evident that per capita energy consumption anticipated in the year 2000 was already achieved in many countries long before 1980. This means that in terms of energy consumption we are 20, 30 or more years behind. The consumption envisaged for the year 2020 was not achieved in the European countries before 1979 (assuming a relatively small growth of consumption in the eighties, it will be achieved in GDR, Norway, Holland and certain other countries), yet it was achieved in the United States between 1950 and 1964 (depending on the development variant).

This shows that it is not realistic to expect the anticipated consumption in Yugoslavia over the next 40 years.

3. Electric Power Needs

It is possible to compute from the relationship (3) in the first section the per capita electric power need and then the total electric power requirement (Table 2.5).

The elasticity coefficients between the growth of electric power consumption and the growth of the social product are as follows:

Year	V3	V4	V5
1980/1985	1.250	1.246	1.246
1985/1990	1.203	1.195	1.195
1990/1995	1.166	1.155	1.154
1995/2000	1.137	1.125	1.116
2000/2005	1.112	1.103	1.093
2005/2010	1.094	1.085	1.075
2010/2015	1.078	1.073	1.063
2015/2020	1.068	1.059	1.052

Accordingly, it can be said that more optimum electric power consumption has also been included in the anticipated development.

As in the case of total energy, it is possible to determine the electric power requirement per unit of the social product. From the figures given in Tables 2.2 and 2.5 values are obtained for electric power consumption per unit output, which are given in Table 2.6. Accordingly, we should anticipate a gradual increase in electric power consumption per unit of the social product, which has been achieved both in the past and is also being achieved in all the European countries. The reasons for this projection of the development of electric power consumption have been given in Point 12 of the first section.

A comparison has been made of actual electric power consumption in the European countries with the anticipated consumption in Yugoslavia in the years 2000 and 2020. The consumption envisaged in the year 2000 has been achieved in several European countries. The lag in electric power consumption is smaller than the lag in energy consumption. This is probably the consequence of later development, which is based more and more on use of electric power.

4. Energy Needs Met With Firewood

Energy needs determined from relationship (1) did not include consumption of firewood, which cannot be omitted from consideration, since consumption would then be underestimated. That is why the energy from firewood consumed in 1979 has been added to the needs given in Table 2.3, which gave the amounts of energy counted on in the subsequent discussion. These amounts are given in Table 2.7.

Section Three. Primary Forms of Energy and Possibility of Their Use

A. Coal

1. Coal Reserves

Total coal reserves can be classified as actual, probable and possible. Actual reserves are those considered to be so well explored that exploitation can begin, probable reserves are those assumed to exist, but which have not been sufficiently explored, and possible reserves are those assumed to exist on the basis of geological analogies and partial explorations. Further exploration may gradually upgrade probable reserves to actual reserves and possible reserves to probable reserves.

The reserves counted on in this discussion are based on figures contained in the detailed study "Projection of the Development of Coal Consumption in the SFRY From 1981 to 1985" (General Association of Yugoslav Coal Mines, Belgrade, 1980). The figures on reserves were obtained from the coal mines, and those figures included reserves found in regions where no coal is at present being mined (for example, deposits in the Croatian Zagorje, in Dalmatia). This, of course, cannot change the picture concerning coal reserves, since the quantities involved are small.

Detailed figures on coal reserves by ranks and republics are found in Table 3.1. Total coal reserves in Yugoslavia are as follows:

10^6 Tons of Coal	Bituminous or Better	Brown	Lignite	Total	%
Actual reserves	61	1,278	13,273	14,612	65.9
Probable reserves	17	335	1,378	1,730	7.8
Potential reserves	37	1,845	4,939	5,821	26.3
Total	115	2,458	19,590	22,163	100.0
Share	0.5	11.1	88.4	100.0	

Bituminous or better coal, then, represents only 0.5 percent, brown coal 11.1 percent, and lignite 88.4 percent of total reserves, which indicates the unfavorable structure of our coal. At the same time, the high percentage of actual reserves (about two-thirds of total reserves) indicates that our coal has been explored to a high extent.

A better picture of the structure of coal reserves is obtained if all coal reserves are converted to quantities of equivalent coal with a minimum heating value of 29.31 megajoules per kilogram. Then we get the following figures on total coal reserves:

10^6 Tons of Coal	Bituminous or Better	Brown	Lignite	Total	%
Actual reserves	53.7	655.2	3,757.1	4,466.0	63.9
Probable reserves	14.6	172.1	479.3	666.0	9.5
Potential reserves	32.6	429.9	1,400.1	1,862.6	26.6
Total	100.0	1,257.2	5,636.5	6,994.6	100.0
Share	1.4	18.0	80.6	100.0	

If, then, we take into account the energy contained in the coal, we get a somewhat more favorable structure, but still lignite represents more than three-fourths of total reserves.

With respect to meeting requirements, however, the figures on the method of exploitation (stripping and underground mining) and on exploitable amounts of coal are more interesting. Not all the actual quantities can be used, and it is assumed that with strip mining it is possible to exploit 90 percent of actual reserves and with underground mining 60 percent.

Actual and Exploitable Reserves

10^6 Tons of Coal	Bituminous or Better	Brown	Lignite	Total	%
Actual reserves					
Strip mining	--	384	11,152	11,536	78.9
Underground mining	31	894	2,121	3,076	21.6
Total	31	1,278	13,273	14,612	100.0
Exploitable reserves					
Strip mining	--	345.6	10,036.8	10,382.4	84.9
Underground mining	36.6	536.4	1,272.6	1,845.6	15.1
Total	36.6	882.0	11,309.4	12,228.0	100.0
Share	0.3	7.2	92.5	100.0	

Quantities of Coal Converted to Coal Equivalent

10^6 Tons of Coal	Bituminous or Better	Brown	Lignite	Total	%
Actual reserves					
Strip mining	--	198.4	3,061.4	3,259.8	73.0
Underground mining	53.7	456.8	695.7	1,206.2	27.0
Total	53.7	655.2	3,757.1	4,466.0	100.0

Quantities of Coal Converted to Coal Equivalent (continued)

10^6 Tons of Coal	Bituminous or Better	Brown	Lignite	Total	%
Exploitable reserves					
Strip mining	--	178.5	2,755.2	2,933.7	80.2
Underground mining	33.2	274.0	417.4	723.6	19.8
Total	33.2	452.5	3,172.6	3,657.3	100.0
Share	0.9	12.4	86.7	100.0	

Consequently, slightly more than 80 percent of the energy can be obtained from the coal by strip mining, more than 80 percent of which is lignite.

Here are figures on per capita reserves in Europe and the world to provide the size of our reserves with a comparison:

Per Capita, tons of equivalent coal	Exploitable Reserves	Total Reserves
Yugoslavia	164	310
Europe (not including the USSR)	391	1,420
World	166	3,030

Consequently, our coal reserves are not large, especially when we take total reserves into account.

2. Characteristics of Coal Deposits

The tectonics of our bituminour or better coal deposits are very complicated. The coal seams are not very thick and are pitching, and they are located at depths between 400 and 600 meters. Exploitation is difficult and complicated, and there is a limited opportunity for use of machinery. The relatively high ash content and especially high content of sulfur put a limit on its use.

The tectonics of brown coal beds are also complicated, the seams sloping gently at 5-25°. Inflows of subsurface water are relatively small, but there are occurrences of methane, which may be even very strong. Seam thickness varies and ranges from 1 meter up to a maximum of 40 meters, but usually they are in the range between 2.5 and 10 meters. Brown coal seams are usually at depths between 150 meters and 400 meters. The conditions of exploitation are complicated except for the beds suitable for strip mining. Use of intensive mechanization is possible at a majority of the deposits with somewhat less favorable parameters. About 30 percent of the brown coal reserves can be strip mined. Our brown coal characteristically has a rather high ash content (20 percent for run-of-mine coal and 15 percent for coal which has been graded) and relatively high sulfur content. The average minimum heating value of the brown coal is 15.0 megajoules per kilogram (3,580 kilocalories per kilogram) and ranges from 12.6 to 20.8 megajoules per kilogram (3,000-5,000 kilocalories per kilogram). [Presumed typesetting errors corrected by translator]

Our lignites belong to young geological formations (the Pliocene and Miocene). The tectonic structure of most of the deposits which can be exploited by the open-pit method is very simple, and it is more complicated only in certain smaller deposits or rather small parts of larger deposits. The thickness of the lignite seams ranges from several to 100 meters. The seams have a slight pitch, usually 3-5°, but as much as 15° in rare cases. Infiltration of subsurface water is moderate, except in two or three cases, and there are deposits without any seepage of subsurface water.

The marked concentration of lignite reserves at a few localities makes it possible to open up large open-cut areas with heavy machinery.

Our lignites have a high moisture content (35 to 54 percent), and most of the reserves contain 44 to 50 percent. Another characteristic is the relatively high ash content, which, when the extreme cases are eliminated, ranges between 17 and 16 percent. The sulfur content is 0.2 percent up to a maximum of 1.2 percent.

Minimum heating value varies within a broad range from 6.28 megajoules per kilogram (1,500 kilocalories per kilogram) to 11.30 megajoules per kilogram (2,700 kilocalories per kilogram). The lignites which can be exploited by the open-pit method (more than 85 percent of the reserves converted to equivalent coal) have a lower heating value than the lignites found at greater depths.

3. Lignite Use

3.1. Use of Lignite in Natural Form

On the basis of experience up to now three basic conditions are required for the technical, technological and economic feasibility of using lignite with a low heating value which can be strip mined:

a) lignite in its natural state must be used within what is referred to as the economic shipping radius, which means that the distance the lignite can be transported from the open pit to the place of use must not be greater than that allowed by acceptable transportation costs and an acceptable demand of energy for transport to obtain the energy contained in the lignite as a fuel. On the basis of many analyses that distance (assuming use of up-to-date transportation equipment) ought not to be greater than about 50 km for our lignites which are strip mined;

b) concentration of production must be facilitated at the strip mine (depending on the mining-geological conditions), highly productive machinery must be used, and the depth-wise position of the seams to be worked must ensure economically acceptable mining coefficients throughout the entire period of exploitation;

c) in the immediate vicinity there must be a large consumer of the lignite produced capable of ensuring uniform consumption of the lignite throughout the entire year.

Condition a must always be met. It usually is not possible to meet the other two conditions fully, since both production and consumption develop gradually and there is always a greater or lesser fluctuation of consumption.

The limited economic feasibility of transporting lignite with very low heating value has particular importance to discussion of lignite use. In practice this means that kind of lignite can be used in its natural state at the mine-head (above all to generate electric power) and in its immediate vicinity (for households and industry).

Lignite with higher heating value than that of the lignites obtained from the strip-mining fields may be economically transported in the natural state over greater distances than 50 km.

3.2. Use of Lignite To Supply Small Consumers

Within the limits of the shipping radius already mentioned it is possible to increase the use of previously graded lignite when bunkers (sales points) have been set up in villages and small urban centers in the vicinity of the coal mines, so that this coal becomes easily accessible to consumers and the coal supply is reliable. There are specially designed bunkers for this kind of coal distribution which afford quite fast loading into all types of vehicles and measuring devices. Experience in certain countries has shown good results, especially when the mines themselves have taken over the supply of these storage facilities.

3.3. Beneficiation of Lignite

When the heating value of the lignite is raised, the economic shipping radius is also increased, and that kind of lignite has greater marketing potential. This can be achieved by drying and briquetting.

3.3.1. Drying of Lignite

The testing of processes for drying lignite began in the fifties. Of the many processes tested the Fleischner process was chosen. The process is discontinuous and is conducted in autoclaves with a volume between 30 and 40 cubic meters, and steam under a pressure ranging from 2.5 to 3.0 megapascals is used for the drying. The process takes between 160 and 200 minutes. During the process the structure and chemical composition of the coal undergo change, and the carbon content increases by about 20 percent.

Today there are three such installations in operation: one at the Kolubara Mine (capacity $0.7 \cdot 10^6$ tons of dried lignite per year) and two in Kosovo (total capacity $1.2 \cdot 10^6$ tons per year).

Although the Fleischner process is the best of the known processes for drying lignite, it has many shortcomings (the process is discontinuous, considerable preparation of the lignite is required before drying, there is additional drying and separation after drying, the water must undergo biological and mechanical treatment before being discharged into the environment, the residue of dry

powder with particle size from 0 to 3 mm is very difficult to find a use for, and the capital investment is high per unit output), so that it has not been applied widely in the world. One should not count, then, on an increase in our capacity to dry lignite, except possibly through enlargement of existing facilities in order to improve the process itself and increase the economic efficiency.

3.3.2. Briquetting Lignite

Experiments have shown that all our lignites can be briquetted with the addition of binders (a few percentage points of resin). One thus obtains a fuel with a heating value between 15 and 17 megajoules per kilogram, which is twice as high as that of natural lignite. That kind of fuel can be transported economically over considerably greater distance than natural lignite.

3.4. Gasification of Lignite

There are in principle three processes for gasification of lignite and coal: conversion to the gaseous state with air (producing a gas of low heating value 5-7 megajoules per cubic meter), and then with oxygen and steam (so-called synthetic gas with a heating value between 12 and 16 megajoules per cubic meter), and when the hydrogen from the latter is used, then the remaining gas becomes richer in methane and its heating value increases and becomes greater (about 33 megajoules per cubic meter). When coal is converted to the gaseous state with hydrogen, one gets SNG--natural gas substitute.

The use of gas obtained by converting coal to the gaseous state with air is limited to the area in the immediate vicinity of the gas plant, since this is a gas with very low heating value which cannot be economically transported over any great distance. For that reason it is not justifiable to build such installations except for specific needs.

Conversion of coal to the gaseous state with oxygen and steam is a process developed nearly 50 years ago. Today there are three processes in use (the Lurgi process and the Cowper-Totzek [?] and Winkler processes). Work is being done meanwhile to develop a number of other processes using higher temperatures and pressures along with improved feeding of the coal and removal of the ash and better control of the composition of the gas produced. None of these new processes has reached the commercial level of development.

It is felt that the Lurgi process has the following advantages: a) its commercial value has been confirmed by many installations that have been built, since it does not create difficulties in operation, b) it can be used for almost all ranks of coal, even those with very high ash content (even as high as 30 percent ash), c) the thermal efficiency is relatively high and amounts to 80 to 85 percent. The Lurgi process, however, has the following defects: a) it needs a relatively large amount of steam, b) the coal must be graded (dimensions 6-50 mm) and must contain only a small amount of dust, c) it produces 5-6 percent oil and tar, which could even be an advantage.

The Cowper-Totzek process has certain advantages over the Lurgi process (coal is fed into the reactor in the form of dust, it does not produce oil and tar, and maintenance is simple), but it has a lower thermal efficiency and there is no methane in the gas produced.

The relatively high methane content in the gas produced by the Lurgi process makes this process suitable as the first stage in a process for production of synthetic natural gas (methane). A plant has been built alongside our lignite mine in Kosovo with six gas generators for gasification of coal by the Lurgi process with a capacity of $480 \cdot 10^6$ cubic meters per year.

The installation at the Kosovo Combine is today operating at one-fourth of capacity. For that reason it is difficult to say anything today about the economic efficiency of that plant's operation.

Certainly an installation for converting coal to the gaseous state requires considerable capital investment (a facility for grading the raw lignite, a facility for drying the lignite, equipment for grading the dried lignite, heating plants to produce the steam, equipment to separate oxygen from the air, to purify the gas and treat the effluents, etc.), so that the economic efficiency of such an installation depends on its capacity and annual utilization of capacity.

A comparative analysis of the economic efficiency of using lignite for the production of gas and of using lignite for the production of electric power ought to show which of these conversions is more favorable, consideration being given here not only to the installations for energy conversion and their energy efficiency, but also the equipment for transportation and distribution and the thermal efficiency from the consumer's standpoint.

Finally, in the more distant future we should count on the development of processes for production of synthetic gas (SNG) from coal, on which intensive work is being done today in the world. This synthetic natural gas ought to replace natural gas itself more and more in the future. Today it is felt that it will be economical to produce synthetic natural gas only from lignite and brown coal.

4. Use of Brown Coal

4.1. Use of Brown Coal in Its Natural State

Brown coal, and indeed even lignite with fairly high heating value, can be economically transported over a greater distance than the lignite with a low heating value. For that reason brown coal should be assigned first of all to supplying industrial and small consumers, since brown coal is one of the principal substitutes for heating oil in industry and households.

The coal for such purposes must be graded, and in most cases washed as well. At our coal mines there are 50 coal separation facilities with a total capacity of about $7 \cdot 10^6$ tons per year.

We should examine in this connection the question of what share of brown coal should be achieved to supply industry and small consumers and what share should go for production of electric power.

4.2. Brown Coal Briquettes

The finer ranks of washed brown coal takes on considerably greater commercial value with briquetting merely with the addition of resin. Aside from the economic gain for the mines, briquettes have a rather wide use, and small consumers achieve better utilization by burning them. The transport and handling of briquettes are also simpler.

4.3. Smokeless Fuel

Low-temperature distillation of washed and dried brown coal yields semicoke, which is briquetted with the tar obtained in the distillation. Briquettes of this kind are heat-treated at a temperature of 300° Celsius (low-temperature oxidation). The result is a smokeless lump fuel which can replace other fuels practically without pollution of the environment. Because of the high heating value (about 25 megajoules per kilogram) there are no limits on the economic shipping radius.

In Lukavac there is an installation for production of smokeless fuel with a capacity between 350 and 400 • 10^3 tons a year. This requires between 580 and 660 • 10^3 tons of washed Banovici coal per year.

4.4. Addition of Domestic Coal in Coke Production

The adding of brown coal to imported coal in coking can to some extent reduce the need for that coal. The possible use of domestic coal depends on the origin of the imported coking coal. When high bituminous coal is imported from the United States, the share of domestic coal can go even as high as 20 percent, but when the ready-made coking mixture is purchased (from the USSR), the share of domestic coal is only between 5 and 10 percent.

The Majevica bituminous or better coal has good coking properties, but the deposit has not been sufficiently prospected.

4.5. Semicoke for Sintering Iron Ores

The sintering of iron ore before reduction in blast furnaces reduces the metallurgical coke needed (by about 100 kg per ton of pig iron). The sintering is done with coke fines and semicoke. Experiments with low-temperature distillation of brown coal have shown that semicoke for metallurgy can be obtained.

5. Use of Coal To Produce Liquid Fuels and Raw Materials for the Chemical Industry

The production of liquid fuels from coal is based on processes (Fischer-Tropsch) developed in Germany between the two wars. The first such installation was built in 1933. Later several installations were built that produced

the liquid fuels needed during World War II. The last was shut down in 1962. After World War II two such installations were built in the Republic of South Africa (capacity $0.2 \cdot 10^6$ tons and about $3.8 \cdot 10^6$ tons of liquid fuels). It is difficult from the available data to estimate the economic efficiency of this operation, but everyone agrees that the liquid fuels are considerably more expensive than liquid fuels produced from petroleum.

Today another process is being studied (Mobil-M) in which synthetic gas is first produced and then methanol, from which the liquid fuels are obtained by a catalytic process. The semi-industrial experiments conducted so far show that gasoline obtained from methanol is considerably more expensive than gasoline obtained by refining crude petroleum.

Studies are also being made today of the possibility of producing ammonia and methanol from coal, but today there are no installations for this operation capable of performing it economically.

Aromatic hydrocarbons and olefins can be produced from coal, that is, from the heavy oil obtained in converting coal to the gaseous state by the various processes.

6. Possible Coal Production

Actual production by ranks of coal in 1980 and projections or estimates of production in coming years are as follows:

10^6 Tons	Bituminous	Brown	Lignite	Total
1980	0.39	9.66	36.95	47.00
1985	0.80	13.00	66.40	82.20
1990	0.80	15.00	124.00	139.30
2000	0.80	22.00	217.20	240.00
2020	0.80	27.00	242.20	270.00

We should mention that 1980 production was projected at $55.0 \cdot 10^6$ tons of coal ($0.5 \cdot 10^6$ tons of bituminous or better, $12.5 \cdot 10^6$ tons of brown and $42.0 \cdot 10^6$ tons of lignite). Actual production, however, was only 85.5 percent of the output planned.

This shows how great the difficulties are which stand in the way of increasing coal production. It is probably also an indication that the production planned in 1985 is too optimistic. It is assumed that production in 1985 will be 75 percent higher than in 1980, which will require very great efforts and excellent organization.

B. Crude Petroleum and Natural Gas

1. The Degree of Exploration for Petroleum and Natural Gas

So far the most promising areas in SR [Socialist Republic] Croatia (the Pannonian and Adriatic areas) and SAP [Socialist Autonomous Province] Vojvodina

have been explored quite intensively. Aside from that, recently exploration of the Adriatic seabed began recently in the region of SR Montenegro and in the region of SR Bosnia-Hercegovina (Posavina, Majevica). Explorations have also been made in SR Slovenia (where small amounts of petroleum are being produced even today), in SR Bosnia-Hercegovina (before World War II and in the sixties) and in the region of SR Serbia proper. As shown by the explorations to date, the possibility of finding commercial deposits of petroleum and natural gas is much smaller than in the Pannonian region and under the Adriatic, which means that those explorations should not have the same level of priority as explorations in the promising regions.

In the Pannonian area sediments have been explored to a high degree to a depth of 3,000 meters, and the entire present production of crude petroleum and natural gas is being taken from those sediments. Further exploration work will be aimed at finding remaining traps for hydrocarbons which are considerably more difficult to detect. In those traps crude petroleum deposits are mainly anticipated with reserves that will make it possible to maintain the present level of petroleum production in the Pannonian area over the next 5 to 10 years.

Sediments at depths greater than 3,000 meters have been rather little explored. A part of the present production of natural gas and condensate is being obtained from them. Explorations to date have established sizable reserves which will make it possible to increase the production of gas and condensate in the periods to come. Moreover, it can be confidently stated that further exploration will prove reserves of gas and condensate which will make it possible to increase production further.

The carbonate sediments of the Dinarids (on the mainland) have been relatively little explored, but the exploration work done to date indicates that there are very small prospects for finding major deposits of hydrocarbons. The thickness of the layer of these sediments is between 3,000 and 7,000 meters. The layer of sediments beneath the carbonate strata is practically unexplored. The promising nature of these sediments is indicated by occurrences of asphalt on the surface and the results of the Brac-1 exploratory well, but it will be possible to define this more accurately only after surface exploration work and exploratory drilling.

The northern portion of the offshore Adriatic (to a depth of 90 meters) has been partially explored, and gas deposits have been found in sediments to a depth of 2,000 meters. The forecast reserves in this area and to the depths mentioned make it possible to estimate that it will be possible to achieve a production corresponding to the production in the Pannonian region. Deeper sediments in the northern section of the Adriatic are practically unexplored with deep drilling, but the surface work indicates prospects similar to those in the deeper strata of the Dinarids.

The middle and southern sections of the offshore Adriatic (the region of SR Croatia) are completely unexplored with deep drilling. Surface exploration work indicates the possibility of finding hydrocarbons in quantities which might considerably augment their production.

The level of exploration of the territory of SAP Vojvodina was estimated in the period 1977-1979 at about 50 to 68 percent, and it is closely tied to the estimate of the total potential of petroleum and gas deposits. Further intensive explorations up to 1990 and explorations of lesser intensity up to the year 2000 will increase the level of exploration of that area to about 87 percent. It is estimated that by the year 2020 about 90 percent of the reserves will have been discovered. That is the maximum extent of exploration, and it is felt that it would not be advisable to make investments in further exploration after that.

The Montenegrin offshore region has been relatively little explored even though exploration work on the mainland was done earlier. Current activities require interpretation of the initial results so that further explorations might be planned. Unfortunately it has not been possible to obtain more detailed information. The figures obtained so far indicate that it is sensible to continue further explorations.

Table 3.2 contains figures on potential reserves of petroleum and natural gas given in millions of tons equivalent to petroleum, since it is impossible at this phase of exploration to separate the reserves into petroleum and gas. In addition, Table 3.2 gives figures on geological reserves (Category A, B and C^1) separately for crude petroleum and natural gas. Of course, only reserves which could be ascertained on the basis of more extensive explorations have been put in the potential and the geological reserves. That is why Table 3.5 contains data, aside from the Pannonian region, only for the northern Adriatic region.

2. Exploration and Production of Petroleum and Gas in Other Countries

Both INA-Naftaplin and Naftagas have taken part, either independently or jointly, in exploring for petroleum and gas in other countries.

Explorations abroad are not cheap. Thus in the period 1975-1980 INA-Naftaplin invested an average of about $10 million a year, and over the period 1981-1985 annual investment of $15 million is assumed.

The first commercial deposit of petroleum discovered in those explorations was found in 1981 in Angola, in Block 3, in whose exploitation our two organizations each have a share of 5 percent. Preparations are under way to begin development of the field. At the same time a second commercial deposit has been detected in the same block. In Gabon, where both organizations have been working, favorable results are also anticipated.

Explorations in other countries, when those explorations involve the right to a portion of the petroleum found, require foreign exchange which must be available if these projects are not to be given up and the right to a portion of the petroleum found relinquished. The relinquishment of these rights when explorations are promising means not only a financial loss for the work organization, but also a loss for society as a whole.

3. Offshore Exploration for Petroleum and Gas

The extent and intensiveness of exploration for petroleum and natural gas on the mainland, and even more offshore, have been limited by the shortage of funds, which especially applies to the foreign exchange necessary to purchase equipment, replacement parts and supplies for work we do ourselves and then to finance work which we cannot do ourselves or is not economically feasible to do ourselves.

Because of these difficulties there has been a lag in the planning of explorations, in the development of new fields, and in the introduction of secondary methods of exploitation, all of which is slowing down the growth of production, slowing down the pace of exploration of the offshore Adriatic, as well as the activation of the deposits now known to be suitable for commercial production.

That is why foreign enterprises began to be engaged in offshore explorations in the region of SR Croatia and SR Montenegro. The basic problems are the same, but the practical solutions differ. We present here the views of Naftaplin, which it seems are important to practice in general as a possible regulation of the status of the foreign partners.

Since offshore oil and gas explorations, especially at depths greater than 100 meters, are very expensive and risky, and because of the almost constant shortage of financial resources (especially foreign exchange), they have been conducted very slowly. INA-Naftaplin adopted the conception in 1973 of including foreign partners in these explorations.

Since under the law in effect contracts could not be concluded with the foreign partners, Naftaplin, with the help and support of republic and federal authorities, instituted proceedings for adjusting the law to this type of investment. The main requirements were incorporated in the new law adopted in 1978. That is when preparations began to be made to conclude contracts with foreign partners for exploration in three regions (each with an area of 4,000 square meters) in the middle and southern parts of the Adriatic. During 1981 the interested foreign companies were invited to examine the technical documentation and to submit bids. The companies which submitted the most favorable bids were invited to negotiations and for final conclusion of contracts, which were concluded at the beginning of March 1982.

Under those contracts seismic measurements must begin no later than 4 months, and drilling 10 months, from the date when the contract takes effect (which will follow after approval of the Federal Committee for Energy and Industry). The minimum extent of exploration is determined by the seismic survey and from eight deep exploratory wells to be drilled within a period of 2.5 years. The maximum value of the investment in the first 2.5 years is $90 million. If explorations continue after the first 2.5 years, each company must over the following 2 years drill another four wells, at an investment of $40 million.

The contracts envisage that if commercial reserves are discovered, production must begin within a period of 3 years.

During the preparations for those explorations Naftaplin obtained a semisubmersible drilling platform which will be used in the first phase of exploration. Thought is being given to building one more such platform ("Split" Shipyard), which could be included in the exploration program in 1984.

4. Augmenting Recovery in Exploration of Petroleum Deposits

Only a part of the actual petroleum reserves can be brought to the surface by using the natural conditions that prevail in the petroleum reservoirs. The percentage of exploitation of actual reserves is called the withdrawal. In Naftaplin the withdrawal of discovered reserves was 25 percent up until 1970, and the lowest withdrawal (only 17 percent) were in fields with the largest reserves.

The withdrawal can be increased by applying secondary methods in recovering the petroleum (expelling the petroleum with water or gas). Use of these methods is very expensive, and it becomes possible only when prices of domestic petroleum have been raised. Up to now secondary methods have been in use at four deposits (Ivanic-Grad since 1972, Benicanci since 1975, Zutica-C since 1978, and Sandrovac since 1982). By 1985 the use of secondary methods is envisaged at other fields with large reserves. Use of these methods has so far increased the withdrawal from 25 to 38 percent. In 1981 about 1 million tons of petroleum were produced over and above what could have been produced without the use of secondary methods.

Work is now being done to test the possibility of using what are referred to as tertiary methods. An analysis has been made of possible procedures for further expelling of petroleum. The results show that the use of carbon dioxide offers the greatest promise. There are plans for an experimental device in the Ivanic-Grad field, where water has been injected the longest. If good results are obtained, that process might also be applied at other fields.

The importance of using these methods is illustrated by the forecast of Naftaplin that in the year 1985 almost 89 percent of production ($3.4 \cdot 10^6$) will be obtained thanks to natural and artificial flooding, about 9 percent from new deposits, and about 2 percent from the remainder of the old field.

Secondary methods will begin to be applied in the Naftagas region beginning in 1986, and that only at two deposits, since the geological conditions in that region are unfavorable for that application. Nevertheless, it is expected that production will be increased by about 160,000 tons thanks to that application.

5. Possible Petroleum Production

The possibilities for future petroleum production will depend on a number of circumstances occurring for the producers in two forms: internal circumstances which they can affect. And external. That is, whereas the possibility for development of production on the basis of reserves already established is relatively well known, the actual dynamic pattern of production will depend on a number of external factors (the foreign exchange and foreign trade systems, and

often even obstacles of an administrative nature). This uncertainty is compounded when it is a case of activating potential reserves, especially those reserves which have yet to be discovered.

This is necessary, since it is well known from past experience that production possibilities which have already been forecast undergo constant revisions because new knowledge is obtained. Table 3 should also be taken in that light; it contains forecasts of petroleum production taken from the detailed study entitled "Projection of Explorations and Production of Petroleum and Gas in the SFRY up to the Year 2000," which was done jointly by Naftaplin and Naftagas. Estimates for the years 2010 and 2020 were based on consultations with those organizations.

There are, however, other forecasts of future petroleum production as well. They, of course, depend on the approach, but it is certain that views on reserves and views on possible petroleum production do need to be revised from time to time.

Acceptance of the forecast indicated or of any other, however, cannot influence the basic policy governing the development of energy, since optimistic estimates do not show that needs can be met with domestic production.

Whatever the estimates of future petroleum and gas production are accepted, they will not be realized unless the funds are furnished for intensive exploration.

Estimates of petroleum production given in Table 3 were prepared in 1979, assuming, of course, a certain pace of exploration. In the period since those estimates were made, plans have not been fulfilled for explorations and drilling, so that it can be said that those estimates of petroleum production are optimistic. This especially applies to the year 1985, and that both from domestic deposits as well as on the basis of explorations abroad.

6. Possible Production of Natural Gas

Forecasts of natural gas production are based (Table 3) on the detailed study of Naftaplin and Naftagas dating from 1979 which has already been mentioned.

The most recent indications suggest even today that production of natural gas from the offshore Adriatic will be late and will probably begin in 1986, with a maximum output up to $400 \cdot 10^6$ cubic meters and that, according to more recent knowledge, without more detailed treatment of the deep zones of the offshore Adriatic, a maximum production of $6.00 \cdot 10^6$ cubic meters can be expected from the Adriatic up to the year 2000. At the same time there are indications that the shortfall of production from the Adriatic (Table 3) could in part be offset by increased production in the Pannonian region beginning even in 1985.

7. Importation of Natural Gas

On the basis of the long-term contract with the USSR 3 billion cubic meters of natural gas are being imported annually. The following distribution of that gas has been agreed on:

Naftagas	
For SAP Vojvodina	$253 \cdot 10^6$ cubic meters
For SR Serbia proper	$1{,}077 \cdot 10^6$ cubic meters
For Bosnia-Hercegovina	$320 \cdot 10^6$ cubic meters
INA-Naftaplin	
For SR Croatia	$600 \cdot 10^6$ cubic meters
"Petrol"	
For SR Slovenia	$750 \cdot 10^6$ cubic meters

It is felt that in future an effort should be made to increase the amounts of natural gas imported (whether from the USSR or from Algeria or from some other country). Imports of natural gas will depend on the rate of exploration and exploitation of our own fields.

8. Refinery Capacity and the Structure of Production in Refineries

Differences crop up in determination of refinery capacity, since annual capacity is computed on the basis of daily capacity multiplied by 330.333 or 347 days. Table 3 contains figures on average refinery capacity in 1980 and 1985.

In addition to that primary capacity in our refineries, numerous secondary installations have been built, and others are under construction. The representation of secondary installations in our refineries is similar to that at refineries in western Europe. For example, in France, Italy, West Germany and Great Britain the share of cracking installations is between 6.7 and 12.8 percent (12 percent in our case), and the share of reforming installations between 7.9 and 12.1 percent (in our case reforming plus isomerization is 15 percent). Accordingly, the technological structure in our refineries is not inferior to that in West European refineries.

The structure of output in refineries is always a function of two factors: the factor of demand and the factor of the technological structure of the refinery. That is why one cannot speak about any optimum quantities of white and black derivatives. Aside from heating oils (light, medium and heavy) the black derivatives include asphalt, petroleum coke, paraffin and certain greases as residues of distillation.

According to figures on the structure of production and the structure of consumption it is obvious that the structure of production is better than the structure of consumption, since a large shortage of heating oil is occurring.

Given the technological structure of the refineries (after completion of secondary capacities now under construction) the domestic refineries will be able to meet all our needs, including the needs of the heavy petrochemical industry, provided as much petroleum is refined as our market needs.

9. Consumption of Petroleum Products for Nonenergy Purposes

Estimates of consumption of petroleum products for nonenergy purposes are shown in Table 3.6. These petroleum products are intended for the petrochemical industry, which is the basis for production of many products needed by the rest of industry and imported at the present time.

An increase in the consumption of petroleum products for nonenergy purposes has not been envisaged for the period after the year 2000, since there are no figures which would be able to give any sort of a picture of the future development of that consumption. In the balances, however, it is assumed for the period after the year 2000 that consumption of petroleum products for nonenergy purposes will be greater. Aside from that, in the period up to the year 2000 a somewhat lower consumption of petroleum products for these purposes was assumed, since a slower development of petrochemical production capacities was postulated.

C. Water Power

Yugoslavia's gross water power amounts to about 110 billion kwh a year, and it is technically possible to use about 66 billion kwh per year. However, no estimate has been made of economically feasible water power, but it is calculated that under present conditions about 55 billion kwh per year could be used economically. We should bear in mind in this connection that today construction of certain hydroplants has been made practically impossible, since transportation routes and settlements have been built in the river valleys, so that construction of hydroplants according to earlier conceptions would require considerable displacements of highways and railroad lines and large resettlement of the population, as well as the flooding of land which is usually the most fertile.

Up to now about half of the water power thought to be capable of economical construction has been lost. The largest opportunities still exist on the Drina, along with the Tara and Piva, where it is still possible to achieve an average annual production of about 8 billion kwh, and that in relatively large installations. And then on the Neretva (about 3 billion kwh) and on the Vardar with tributaries (about 3 billion kwh). The remaining hydroplants on the Drava, hydroplants on the Sava, Morava and Bosna are mainly hydroplants with low heads. Such hydroplants usually have high specific investments, and their construction is more economical if standardized equipment is used.

In recent years construction of hydroplants has been neglected, since the most economical hydroplants have already been built. However, there are hydroplants which are economical, but which cannot be built because of disagreements about use of the water. These are the hydroplants on the watershed of the Drina and tributaries. The views among the republics should be reconciled as soon as possible and construction begun on those hydroplants out of the desire to achieve the greatest benefit to the entire community. Moreover, many water management solutions to use streams for energy were prepared as much as some 20 years ago, and they were tailored to the economic and electric power conditions at that time. That is why it would be useful to adapt such

solutions to present conditions, taking into account the higher prices of fuels and the need for the best possible use of the land to produce food. Conditions have changed with respect to the purchase of land and the communications routes that have been built, the altered relations within the electric power system because of the increasingly small share of hydropower, which will diminish the importance of large storage reservoirs and will call for an increase in the installed capacity of hydroplants.

D. Uranium Reserves

Actual uranium reserves amount to only 2,740 tons of uranium concentrate (U308) and they are found at a single deposit (Zirovski Vrh) and represent only 4 percent of total probable and possible reserves. This shows that the extent of uranium exploration in Yugoslavia is very low.

The most recent reports on explorations in SR Slovenia show that the total reserves in the Zirovski Vrh massif amount to 320,000 tons and that another 10,000 tons in the vicinity of Skofja Loka should be added to total reserves.

The figures show that if explorations are intensified we can expect to establish new reserves. This applies not only to Yugoslavia, but also to many other countries, especially the developing countries in which extensive explorations have not been done. That is why it is possible to secure additional quantities of uranium for our needs by employing our organizations in explorations in the developing countries.

Today there is only one work organization which is preparing for production of uranium concentrate (the Zirovski Vrh Uranium Mine). Commencement of production (120 tons of U308 annually) is envisaged for 1984. The price of the concentrate produced will be about three times higher than the present world price. Even that relatively high a price is supportable, since then it would have a share of 0.24 dinar in the price of the electric power produced (in a pressurized light-water reactor PWR), which is less than the costs of fuel and lower than the costs of furnace oil.

A characteristic of the first phase of building the mine and ore processing facility at Zirovski Vrh is the incompleteness of the processing capacity and the relatively high costs of the infrastructure. That is why preparations are being made for construction of the second phase, which, in assuming intensive financing and the necessary exploration work, could be completed by 1988/89. Construction of the second phase would increase production capacity to 240 tons of U308 per year, and the production price would drop about 24 percent. Maximum capacity of the Zirovski Vrh Mine is 430 tons a year, which could be achieved by 1995. If mining explorations are continued, that kind of output could be maintained up to the year 2015, at a price which is twice as high as the present world price, which means that the costs of fuel would at present prices be 0.16 dinar per kilowatt-hour.

Construction of the maximum capacity of the Zirovski Vrh Mine would provide the annual fuel charge for three nuclear power plants, but without the initial fuel charge of the reactor core.

As a practical matter it is possible to produce uranium concentrate from phosphate in the process of manufacturing phosphoric acid. The phosphates imported contain relatively large amounts of uranium. Experimental equipment for that kind of production is in preparation. It has been calculated that about 150-250 tons of uranium concentrate could be obtained from existing factories or those under construction at Kutina, Prahovo, Sabac, Titov Veles, Trepca and Hrasnik, which is not counting processing in smaller plants.

On the basis of what we have said, it is possible to furnish uranium from domestic production up to the midnineties for nuclear power plants with installed capacity of 2,500 to 3,000 MW. A further increase in installed capacity of nuclear power plants would require intensified exploration for uranium within the country and in the developing countries.

It is also felt that we should not neglect the possibility of purchasing uranium abroad, since the share of uranium in the production price of electric power is low.

E. Bituminous Shale

Bituminous or oil shale is sedimentary rock with a greater or lesser content of organic material dispersed in the rocks in the form of tiny particles. This organic material is called oil or kerogen. The hydrocarbons in oil shale are like wax, but gaseous and liquid hydrocarbons can be obtained from them by destructive distillation. The content of kerogen in oil shale varies from 20 to 400 liters per ton. Most oil shale contains less than 40 liters of kerogen per ton. According to certain estimates, reserves of oil shale in the world are so large that they could yield about $500 \cdot 10^9$ tons of kerogen, which is more than even very optimistic estimates of crude petroleum reserves.

Although bituminous shale, in its composition, represents an energy fuel, its use necessitates the solving of many technical, technological and economic problems. That is why today it can neither be asserted nor forecast what sort of role shale could have in future meeting of energy needs. It will depend, that is, on development of methods of exploitation and processing methods. However, the experience and knowledge acquired to date cannot yield an authoritative basis for an exploitation that would guarantee an acceptable price of the product, since today there are only small-capacity pilot installations for using them. In spite of that it appears certain because of the limited reserves of crude petroleum that in the future products obtained from exploitation of oil shale will replace petroleum products. When that will be economically justifiable depends on a number of factors which cannot today be predicted.

It seems that oil shale is quite widespread in our country, since it exists in almost all regions, but exploratory work has not so far been undertaken to establish the quantities and quality of the oil shale. According to present knowledge, there are large reserves of oil shale in the region of Aleksinac which were found in exploration for coal. The known data, however, are not sufficient for any very serious or authoritative conclusions.

Total reserves in the Aleksinac region are estimated at about $2.4 \cdot 10^9$ tons with a kerogen content between 6 and 17 percent. Assuming that about $1.5 \cdot 10^3$ tons of oil shale could be mined and that it would be possible to attain 80 percent of the kerogen they contained, the result would be $120 \cdot 10^6$ tons of kerogen, which approximately corresponds to the same amount of crude petroleum.

In view of all we have said it would be worthwhile to explore the potential deposits in more detail and to follow development and results of research in the world.

F. Geothermal Energy

Yugoslavia does not have natural sources of hot water or steam which could be used for production of electric power (this requires a temperature of at least 130° Celsius to achieve any sort of favorable energy efficiency). The natural hot-water springs also have relatively low volume and relatively low temperatures (between 20 and 80° Celsius, and most springs have a temperature between 30 and 35° Celsius), so that they can be used in an energy sense only for recreation and medical treatment, as well as a means of heating greenhouses.

There also exists another possibility for using energy accumulated underground in the deeper strata. The temperature at the surface of the earth depends mostly on solar radiation, but the influence of that radiation is observed only to a depth of about 30 meters. At that depth the temperature remains practically constant, but it increases with greater depth. The temperature gradient, the increase per kilometer of depth, is 30° Celsium per kilometer immediately close to the surface, but it becomes smaller and smaller as the distance from the surface of the ground increases. The rise of the temperature with depth is a consequence of the hot currents constantly flowing from the interior of the earth toward the surface. That heat cannot be used because the density of the energy is very small (about 5.4 kilojoules per square meter per day) and because the temperature is practically the same as the temperature of the environment. It is therefore necessary to use either natural water circulation or to create conditions for that kind of circulation, and that is optimum if the level of temperature is sufficiently great.

We have not made any specific investigation of the possibility of using geothermal energy, but there are numerous data based on wells drilled in exploring for petroleum and gas. It is possible from that data to estimate the average level of the temperature in certain regions, and they are as follows:

Pannonian region	50° Celsius/km
Dinarids	15° Celsius/km
Offshore Adriatic	25° Celsius/km

A temperature even up to 70° Celsius per kilometer has been recorded in certain areas of the Pannonian Depression.

The maximum temperature ascertained in the northern Pannonian region goes as high as 150° Celsius at a depth of about 3,000 meters. The results of exploration to date suggest the conclusion that one might expect in the Pannonian

region the existence of hot water with a temperature up to 120° Celsius at depths of 2,000 to 2,500 meters. That means that in that region we should not expect hot water with higher temperatures, and we therefore should not expect to be able to produce electric power by means of geothermal energy.

The energy accumulated in hot water which is located at those depths could be used if brought to the surface to heat dwellings or for low-temperature processes in industry, but only in the immediate vicinity of the wells (mostly within 10 km or so), since it would otherwise be uneconomical. The water obtained from the wells usually cannot be used because of the high salt content, and it will therefore be necessary to use heat exchangers, which will increase the investments required. That water, of course, went underground from the surface, originated in precipitation, so that the possibility of exploitation depends on the inflow of water from the surface.

There are, then, potential opportunities for use of our geothermal energy. There is a need to study and systematize the results of explorations for petroleum and gas, to organize additional explorations in regions which have the greatest promise, and to prepare exploitation if the results are favorable. It is felt that the geothermal energy is the first of the alternative energy sources that might be utilized in our country.

G. Energy of Solar Radiation

The possibility of using solar radiation depends on the duration of insolation. A distinction has to be made in this connection between the possible duration of insolation, which in our geographic latitudes amounts to about 4,470 hours per year, from actual insolation, which is much less because of clouds and fog. The actual duration of insolation amounts to about 1,600 to 2,700 hours a year, which represents 18 to 31 percent of the length of the year.

Also, the strength of the radiation depends on the time of year and the time of day as well as on the placement of the plate which is receiving the solar radiation. It is certain that the radiation of energy varies from year to year depending on the cloudiness.

The average annual energy irradiated amounts to between 1,090 (northwestern part of the country) and 1,570 kwh per square meter (southern Adriatic and southern part of Macedonia).

As a practical matter there are three possible ways of using solar radiation: low-temperature use to heat water and space, high-temperature heating to produce electric power, and direct conversion to electric power.

Water is heated with solar radiation in low-temperature devices. The heated water can be used as a means of heating water in households or for space heating. Temperatures of about 80° Celsius can be attained. Collectors are used for heating water which are usually placed on the roof of buildings. It seems that today practical use is limited to the use of hot water for households, especially for camps and hotels, and that in the summer tourist season. Good utilization of the equipment can be achieved, since consumption of hot water

is almost uniform throughout the year. In any case, however, an additional equipment is required to heat water on days when insolation is inadequate. The experience at a campground in Istria shows that consumption of other forms of energy can be reduced by about 50 percent (this certainly is true of the summer season).

The use of solar radiation for space heating, however, does not have great promise, since it is probably necessary to have collectors on the roof of the building with an area equal to the area of the dwelling which one wants to heat, since utilization of such a device is very poor because of the small amount of irradiated energy at a time when the heating is most necessary and since the heating equipment based on other forms of energy that would be necessary is of practically the same capacity as when there is no device for heating using solar radiation. That is why home heating is possible to some extent in one-family houses, but it is out of the question for multistory buildings unless the grounds in the vicinity are used to locate the collectors, which would require a large area. Aside from that, setting up the collectors increases the size of the investment, which will discourage many from installing them unless they are provided favorable credits, premiums or the like, which has been done in certain countries.

Electric power can be generated by heating water, for example, by concentration of solar radiation. According to data in the literature, in the United States an experimental solar power plant with a capacity of 100 MW is being built; it would have 12,500 mirrors each with an area of 40 square meters (total area 500,000 square meters, 500 x 1,000 meters), by means of which the reflected rays would be concentrated in a tower furnace 250 meters high. The mirrors would be movable and would follow the movement of the sun. The efficiency of this kind of solar power plant would amount to about 22 percent at the moment of maximum insolation. Since efficiency drops with a decrease of insolation, an average efficiency of about 20 percent should be assumed. Under our most favorable conditions (the southern Adriatic) that kind of solar power plant could have an annual output of $1.56 \cdot 500 \cdot 0.2 = 156$ GWh, which corresponds to utilization of 1,560 hours per year. A conventional steam plant with a capacity of 100 MW can generate 5,600 GWh annually, which means that the solar power plant would have to have a capacity four times as great to produce the same amount of power as a conventional thermal plant.

According to present estimates, the specific investments for solar power plants of this kind would be twofold to fourfold greater than specific investments for conventional thermal power plants, which means that the investments per unit output would be 8- to 16-fold greater if such solar power plants were built instead of conventional ones. If we assume that fuel costs amount to about 50 percent of total costs, the approximate result is that the power from the solar power plant would be 4- to 8-fold more expensive than power from conventional power plants.

We should certainly expect that as the technology develops for making the mirrors, which are the most expensive part of solar power plants, the costs of building solar power plants would drop, but that drop would have to be considerable for solar power plants to become economically interesting.

The situation is still less favorable with respect to direct conversion of solar radiation to electric power. The efficiency of conversion is between 12 and 15 percent (the theoretical maximum is 23 percent), while the investments to generate 1 kw are today between $20,000 and $30,000, and that is between 40- and 60-fold greater than investments in conventional thermal power plants. Assuming that kind of efficiency, a solar power plant with a capacity of 100 MW could generate about 100 GWh per year, which means that a solar power plant would have to have a sixfold larger capacity than a conventional thermal plant for the same output. If we assume that the fuel costs amount to 50 percent of total costs, the electric power from the solar power plant would be between 120- and 180-fold more expensive than power from a conventional power plant. At the present state of the art of manufacturing the silicon wafers used for direct conversion of solar radiation to electricity, the silicon wafers need to operate for 14 years to produce the amount of energy consumed in their manufacture.

At the present moment research and development are aimed at the techniques of producing the silicon cells to reduce the production costs to an acceptable level. According to certain estimates, it is anticipated that by the end of the eighties the production costs will drop to an amount per kilowatt that would meet the specific investments of conventional thermal electric power plants. If those very optimistic predictions are in fact borne out (a reduction of the production costs by 40- to 60-fold), the production costs of energy from solar power plants would be about threefold higher than the production costs in conventional power plants.

At the same time an effort is being made to find other types of solar cells (cadmium sulfide, copper sulfide, gallium arsenide) with which--so it appears--a higher efficiency can be attained.

It should be emphasized, however, that the need for construction of other types of power plants is not as a practical matter reduced by the construction of solar power plants unless the possibility exists for accumulation of the power. The maximum load in the electric power system occurs either in the early morning hours just before the sun comes up or in the early evening hours immediately after the sun goes down, that is, at moments when the solar power plants are unable to produce. Aside from that, maximum electric power consumption occurs in periods when insolation is lowest (in the wintertime). That is why solar power plants, unless there is a storage capability, can only diminish fuel consumption in other types of power plants, but cannot reduce the need for their construction. Accordingly, construction of solar power plants, even if they were competitive with conventional types of power plants in their production costs, would considerably increase the necessary investments for construction of the electric power system, while costs dependent upon output would decrease.

Large-scale construction of solar power plants will be possible from a technical standpoint when the problem of power storage is solved. At the present state of development storage of electric power in storage batteries is out of the question.

It appears that the only acceptable way to store power is to use the electric power produced in the solar cells for electrolysis of water, yielding hydrogen which could be stored in underground spaces and piped to the point of consumption (the way natural gas is today). The consumers could use the hydrogen directly as a fuel without polluting the environment (combustion of hydrogen yields water or steam). The hydrogen might also be used to produce electric power by combustion in boilers which would not differ greatly from present boilers in conventional steam plants. The efficiency of these conversions would be only 5 percent (efficiency of the solar cells 20 percent, of electrolysis 85 percent, and efficiency of thermal electric power plants 35 percent).

A further step in use of hydrogen is to use that fuel in fuel cells in which electric power is directly produced by "cold" combustion of the hydrogen. Fuel cells could be installed in every house (the fuel cell operates altogether silently) and this would utterly alter the system of electric power supply.

All of that, however, is realizable in the distant future (in 30 or 40 years or even more), since both solar and fuel cells need a lengthy development. Another question is whether such a system of power supply will ever be achieved, since it will require very high investments. The practical application of such a system will depend, however, on the possibility of using other new sources of energy (the energy of fusion, energy from dry rocks in the earth's crust), which cannot be anticipated for 30 or 40 years.

H. Wind Energy

To illustrate the possibility of producing electric power using the energy of the wind, conditions have been analyzed on the basis of measurements at four of our weather stations (Belgrade, Dubrovnik, Vrsac, Zlatibor). Wind speeds in 2 years (1975 and 1976) are given with the duration of the wind speeds (Table 3.7). From these speeds one obtains the possible electric power that could be generated in the various intervals of wind speed.

It is certain that the installations should be erected for the wind speed defined as the maximum, that is, the installed capacity. For purposes of the comparison of the sites the installed capacity was determined on the assumption that operation was assured at all sites with a maximum capacity of 300 hours annually. This also determined the possible output, which is less than the maximum possible output, but at the same time we must take into account the fact that windmills of any sizable diameter (several tens of meters) cannot achieve a sufficient speed of revolution if the wind speed is less than 3 meters per second. For windmills with a diameter of 10 meters the minimum wind speed required to achieve the necessary speed of revolution is 6 meters per second. That is why the design calls for installing several smaller-diameter windmills on a single tower.

If we take into account the fact that wind power can be used when wind speed reaches 3 meters per second and that exploitation is limited to the speed that corresponds to the installed capacity, we get the annual outputs per square meter for the four locations under consideration (Table 3.8).

Use of the maximum capacity of wind-operated power plants is very low and amounts to between 550 and 860 hours per year, that is, 6 to 10 percent. Aside from that, a good part of the year the windmill cannot be in operation (when wind speed is less than 3 meters per second). At sites where wind speed is very often less than 3 meters per second, the time when electric power is not being generated amounts to almost two-thirds of the year (Table 3.8).

To offer a picture of the capabilities of wind-operated power plants, such a plant (with a windmill diameter of 100 meters, that is, with several windmills) on a tower whose vane tips describe circles whose areas correspond to a circle with a diameter of 100 meters) with a 300-MW conventional thermal electric power plant, which can generate 1,800 GWh of power per year. Obtaining the same output in wind-operated power plants as in the steam plant mentioned would require building the number of windmills indicated below at the various locations:

Belgrade	2,857 windmills
Dubrovnik	711 windmills
Vrsac	750 windmills
Zlatibor	2,278 windmills

In order to obtain the same output the total capacity of wind-operated power plants, depending on the location, would have to be between 7- and 11-fold greater than the capacity of the conventional steam plant.

However, even if the specific investments for wind-operated power plants were between one-seventh and one-eleventh of the specific investments for conventional thermal plants, the wind-operated power plants would not be more economical than conventional steam plants, since construction of wind-operated power plants could not reduce by even 1 MW the needs for building other types of power plants. Wind-operated power plants, then, cannot guarantee production in periods which are critical in the electric power system (the period of low water, the period of high loads), yet those are the periods that count in determining the necessary construction of power plants to meet consumer demand.

So, wind-operated power plants can reduce fuel consumption in other types of power plants, but they cannot reduce the need to build the other types of power plants.

Aside from that, installations with windmills are not inexpensive. For a windmill with a diameter of 100 meters, the tower must be between 80 and 90 meters high, since wind speeds at ground level are much less than at somewhat higher altitudes. The towers carrying the windmills must be so designed as to withstand the stresses that can occur in hurricane-force winds, since otherwise, were such a wind to occur, many of the towers would be damaged. That demand, of course, increases the necessary investments.

Certainly the figures given for the four locations are not representative of the entire area of Yugoslavia, but they give an idea of the power characteristics of wind-operated power plants. It would be useful to study the conditions

at a number of locations in order to get a fuller picture of wind characteristics.

I. Vegetable and Animal Waste

1. Vegetable Waste

Vegetable waste represents a very large energy potential that is renewed every year.

A hectare of plowland yields about 5 tons of shelled corn and about 4 tons of cornstalks. Cornstalks have a heating value of about 16 megajoules per kilogram, which corresponds to somewhere around 0.55 kg of equivalent coal or a kilogram of brown coal. In an average year in Yugoslavia about $6.5 \cdot 10^6$ tons of cornstalks are taken from plowland, which corresponds to an energy of about $3.5 \cdot 10^6$ tons of equivalent coal. Cornstalks consist mainly of cellulose and are unsuitable for feeding livestock.

It is estimated that 15-20 percent of the cornstalks would be required to dry the shelled corn, and the cornstalks from 4-5 hectares would be required to heat a one-family house. One kilogram of straw is obtained in the production of 1 kg of threshed grain. The heating value of straw is about 12.6 megajoules per kilogram, that is, 0.43 kg of equivalent coal, or about 1.5 kg of lignite. Assuming an average annual output of about $3 \cdot 10^6$ kg of grain, the same amount of straw is obtained, which corresponds to an energy of about $1.3 \cdot 10^6$ tons of equivalent coal.

The total energy from these vegetable waste products amounts to about $4.8 \cdot 10^6$ tons of equivalent coal, which is equal in energy value to the present production of brown coal. Even the use of a part of vegetable waste in farming areas for energy purposes would reduce the use of other forms of energy. Special furnaces would have to be built for this purpose to burn the vegetable waste, and facilities would be needed for their preparation and shipment.

2. Animal Waste

If stable manure is left to decompose in the absence of air, a gaseous mixture containing 70 to 75 percent methane occurs through the action of bacteria. The heating value of that gas is 20-25 megajoules per cubic meter, which corresponds to 0.68-0.85 kg of equivalent coal. To bring that decomposition about it is sufficient to place the animal waste in a covered manure pile. The gas collected in the upper part of the pile can be used directly as fuel in the same way as synthetic or natural gas.

It is thus possible to obtain from the manure of a single cow about 600 cubic meters of gas a year, an amount of energy that corresponds to 400-500 kg of equivalent coal.

According to some estimates, this kind of collection of manure and construction of manure tanks would be justified on farms with more than 10 cows. If the manure from just one-fifth of Yugoslavia's livestock population were used

in this way, the energy obtained would be equal to the energy of about 300 · 10^3 tons of equivalent coal.

In the Asian countries (India, Nepal) this kind of production of fuel gas has been used for a long time now. More recently such manure tanks have been built in Austria and Switzerland. The Italian factory FIAT launched a compact device a few years ago with a gas motor that ran on the gas from stable manure and had an electric generator to produce electric power to electrify livestock farms.

The investments in the manure tanks and the piping of the gas to the point of consumption are minimal, so that it would be worthwhile to build several demonstration facilities in various parts of the country in order to show how such devices operate and in that way to encourage their broader use.

Section Four. Energy Balances

1. Initial Data

The total energy requirement and necessary production of electric power were determined in the second section, and they will serve as initial data in compiling energy balances.

The energy balances were prepared for the lowest (V3) and highest (V5) variants.

The production of electric power was the point of departure in determining the other forms of energy needed (Table 4.1). Intensive construction of hydroplants is envisaged up to the year 2000, when in an average year 55 billion kwh would be generated in hydroplants, assuming that the smaller remaining hydroplants would be built thereafter, but at a considerably slower place. The rest of the electric power is generated in conventional thermal electric power plants and nuclear power plants. The necessary output of nuclear power plants was determined in line with the anticipated possibility of the use of coal.

When we take the internal consumption from the electric power generated (1 percent in hydroplants and 8 percent in thermal plants), we get the power at the buses of the power plants. And if we subtract from the power at the buses all the losses in the networks (12 percent losses in transmission and distribution, which also includes the power for pumping in pumped-storage hydroplants), we get the power delivered to consumers. The electric power generated and the electric power delivered to consumers are shown in billions of kilowatt-hours and millions of tons of equivalent coal (1 billion kwh = 0.123 · 10^6 tons of equivalent coal).

The energy necessary to generate the electric power (Table 4.2) was determined separately for hydroplants (1 kwh = 0.123 kg of equivalent coal) and for thermal plants (1 kwh = 0.420 kg of equivalent coal in 1985, and 1 kwh = 0.395 kg of equivalent coal in the year 2020). The energy necessary to generate the electric power in nuclear power plants was estimated so as to obtain a logical trend of the energy delivered to consumers.

To obtain the energy delivered to consumers we also need to take into account losses in other conversions (conversion of coal and conversion of petroleum) and losses in transport.

Total energy delivered to consumers is given in Table 4.2.

Assuming the distribution of energy delivered to consumers among groups of consumers in 1979, an estimate was made of the share of the various groups of consumers in the energy delivered to consumers. It was calculated that the share of industry, transportation and small consumers would gradually drop off, while the share of agriculture and nonenergy consumption would gradually increase.

That distribution was used to determine the quantities of energy delivered to the various groups of consumers (Table 4.3).

2. Structure of Energy Delivered to Consumers

The share of bituminous or better coal in the energy delivered to consumers is very low, since stagnation of the production of that rank of coal is assumed, and therefore the share of bituminous or better coal is gradually decreasing.

The share of brown coal in supply of energy rises slightly to 10 percent at the beginning of the period under consideration, but after the year 2000 it drops, since industry's consumption is growing faster than the capability for brown coal production. Much the same is the case with brown coal's share in the natural state in the supply of small consumers, note being taken that we have envisaged a considerable growth in the share of brown coal briquettes (which also included smokeless fuel) from 1 percent in 1985 to 8 percent in the year 2000. After the year 2000 the share of both brown coal and briquettes gradually decreases because of the limited production capacities in coal mines.

The share of the consumption of lignite in the natural state decreases more and more, so that in 1995 only industry and small consumers in the immediate vicinity of the mines will be furnished that form of energy. On the other hand lignite is used more and more in enriched form to supply industry and small consumers, and that as lignite briquettes and as synthetic gas. Dried lignite is used only up to the year 1990, which corresponds to the life of the existing installations. Those installations are not being renewed, since the experience to date has not been favorable.

The share of natural gas increases in the supply to industry and small consumers all the way up to the year 2000, and thereafter will slowly decline, since otherwise consumption would exceed production capability.

Firewood is used only by small consumers, and the share of firewood was selected so that consumption would be approximately constant over the entire period. We cannot anticipate, that is, an increase in the consumption of firewood, since wood will be used more and more as an industrial raw material.

The use of alternative forms of energy (geothermal energy, solar energy and energy from waste) has been envisaged beginning in 1995 for supply to small consumers and beginning in the year 2000 for supply of industry as well.

We assumed a constant share of coke in the supply to industry, and it was assumed that a portion of the coke gas would be consumed in industry.

A gradual drop in the share of heating oil to supply industry and small consumers is assumed. This share drops from 28.5 percent in industry and 21.0 percent to small consumers in 1985 to 5 percent and 3 percent, respectively, in the year 2000. This gradual decrease is necessary because of the modification of boilers.

A drop in the share of gas oil (extralight heating oil) in supplying industry and small consumers is also envisaged.

The share of electric power in supplying all groups of consumers (except for nonenergy consumption) is gradually increasing because electric power consumption is increasing faster than total energy consumption.

The share of steam and hot water is not high, since this applies only to steam and hot water produced in public heating plants. Industrial boiler plants and heating plants are not shown separately, and the energy delivered to industry also includes energy for production of steam and hot water.

Gasoline, jet fuel, gas oil and electric power have been envisaged for supply to transportation, and gasoline, gas and electric power for supply to agriculture. Natural gas, primary gasoline and other petroleum derivatives (oil, petroleum coke, asphalt, etc.) have been envisaged for nonenergy consumption.

If the forms of energy are divided into primary and converted forms, the resulting structure of energy delivered to consumers is as shown in the table.

Year and Variant		Primary Form	Converted Forms		
			From Coal	From Petroleum	Electric Power and Steam
1985	V3	24.4	9.1	49.1	17.4%
	V5	24.3	9.1	49.1	17.5%
1990	V3	26.7	12.8	41.2	19.3%
	V5	26.5	12.8	41.1	19.6%
1995	V3	27.2	17.1	34.4	21.2%
	V5	26.6	17.0	34.1	22.3%
2000	V3	26.5	19.7	31.4	22.4%
	V5	25.5	19.2	31.5	23.8%
2010	V3	23.6	19.3	31.6	25.2%
	V5	23.6	19.2	31.9	25.3%
2020	V3	23.4	17.8	32.7	26.1%
	V5	22.3	17.9	32.8	27.0%

As we see, the share of primary forms of energy is dropping steadily. The converted form obtained from coal (coke, briquettes and synthetic gas) increase up to the year 2000 and then gradually drop because of the limited capacities of the mines. The share of liquid fuels at first drops because of the smaller consumption of heating oil, and then slowly increases because of increased consumption in transportation and agriculture. The share of electric power increases steadily.

If the forms of energy are divided into solid, liquid and gaseous fuels, we get the following structure:

Year and Variant		Primary Form	Converted Forms				
			Solid Fuels	Liquid Fuels	Gaseous Fuels	Electric Power and Steam	Alternative Forms
1985	V3	15.8	8.4	49.1	9.3	17.4	-- %
	V5	15.7	8.3	49.1	9.4	17.5	-- %
1990	V3	13.5	9.6	41.2	16.4	19.3	-- %
	V5	13.5	9.5	41.1	16.3	19.6	-- %
1995	V3	12.2	9.7	34.1	22.2	21.2	0.3%
	V5	11.8	9.6	34.1	21.9	22.3	0.3%
2000	V3	9.4	10.9	31.4	24.9	22.4	1.0%
	V5	8.9	11.0	31.5	23.8	23.8	1.0%
2010	V3	7.5	11.2	31.6	22.8	25.2	1.7%
	V5	6.8	11.3	31.9	22.9	25.3	1.8%
2020	V3	6.5	11.0	32.7	20.4	26.1	3.3%
	V5	5.8	11.0	32.8	20.4	27.0	3.4%

The share of solid fuels (primary and converted solid fuels) which consumers take directly, decreases as a whole, but at the same time more and more use is being made of the converted solid fuels (coke and briquettes). The gaseous fuels include natural gas, synthetic gas from coal, and coke gas. Their share increases up to the year 2000, but afterward declines because consumption grows faster than the capacity for production.

All the figures given pertain only to energy delivered to consumers, but total energy needs also include the energy for energy conversions.

3. Structure of Total Energy

We need to add to the energy delivered to consumers the energy necessary for energy conversions, the energy required to power energy installations, and energy losses. The energy for energy conversions is divided into energy for generating electric power and energy for other conversions (petroleum refining, the coking of coal, production of briquettes and synthetic gas). The losses include losses in transport and handling of petroleum, losses in transmission and distribution of electric power, and losses in distribution of steam and hot water. The energy used in operations includes part of the natural gas injected into petroleum reservoirs and to drive compressors, a part of the coke gas used to heat coke furnaces, a part of the heating oil and the refinery gas

for operation of petroleum refineries and a part of the electric power produced for the internal needs of power plants. We should also mention that the losses and internal energy use were estimated, and they had to be reconciled with the initial data.

The first thing to examine in an analysis is the structure of primary forms of energy, since all the converted forms of energy are obtained by transformation of the primary forms of energy.

Certainly the most interesting question is how the structure of the necessary forms of energy changes. From the energy balances we get the structure of primary forms of energy shown in the table:

Year and Variant		All Ranks of Coal	Crude Petroleum	Natural Gas	Water Power	Nuclear Fuel	Firewood	Alternative Forms
1985	V3	40.3	41.9	7.8	6.4	1.3	2.3	-- %
	V5	40.3	41.9	7.8	6.4	1.3	2.3	-- %
1990	V3	44.6	34.7	10.7	6.7	1.1	2.2	-- %
	V5	45.6	34.2	10.4	6.5	1.1	2.2	-- %
1995	V3	48.8	28.5	11.5	6.7	2.3	2.0	0.2%
	V5	51.5	27.2	11.1	6.0	2.2	1.8	0.2%
2000	V3	49.3	25.7	12.4	6.5	3.8	1.6	0.7%
	V5	52.3	24.5	11.6	5.6	3.8	1.5	0.7%
2010	V3	54.2	23.9	10.4	4.7	4.4	1.3	1.1%
	V5	48.7	24.6	10.7	3.8	9.8	1.2	1.2%
2020	V3	45.7	25.4	9.8	3.3	12.5	1.0	2.3%
	V5	39.3	25.2	9.3	2.6	20.4	0.9	2.3%

The share of all ranks of coal increases up to the year 2000, but after that this share drops because it is impossible for coal and lignite production to keep up with the growth of energy consumption (restriction because of limited reserves and because of limited capacity of the mines). The share of crude petroleum drops rapidly at the beginning of the period under consideration, but afterward that decrease is slow, since we assume replacement of petroleum products in transportation and in agriculture. The largest increase occurs in the use of nuclear fuels after the year 2000, since there are no other possibilities for generating electric power.

The primary forms of energy are used in part for direct supply to consumers and for energy conversion. The structure of use is evident in the following table:

Year and Variant		Delivered to Consumers	For Electric Power	Other Conversions	Internal Use and Losses
1985	V3	18.1	31.4	49.7	0.8%
	V5	18.1	31.7	49.4	0.8%
1990	V3	19.5	34.0	45.6	0.9%
	V5	19.3	34.8	45.0	0.9%

Table (continued)

Year and Variant		Delivered to Consumers	For Electric Power	Other Conversions	Internal Use and Losses
1995	V3	19.5	35.5	44.2	0.8%
	V5	18.5	39.0	41.7	0.8%
2000	V3	18.6	36.4	44.2	0.8%
	V5	17.3	40.5	41.4	0.8%
2010	V3	15.6	43.2	40.5	0.7%
	V5	15.7	42.1	41.5	0.7%
2020	V3	15.6	41.3	42.4	0.7%
	V5	14.7	42.1	42.5	0.7%

A characteristic feature of development is gradual reduction of the share of those forms of energy delivered directly to consumers and a gradual increase in the share of primary forms used to generate electric power. Reduction of that share at the end of the period under consideration (in the year 2020) is a consequence of the considerable increase of output in nuclear power plants.

4. Production of Electric Power

The structure of the electric power output is shown in Table 4.4, and the installed capacity of power plants in Table 4.5. The necessary installed capacity of power plants represents an estimated value, since detailed analysis is required to determine more precise values.

According to those estimates, the construction of conventional thermal electric power plants required would be as shown in the table.

Year	V3	V4	V5
1985-1990	2,850	4,130	4,130 MW
1990-1995	2,360	2,840	4,090 MW
1995-2000	2,570	3,000	5,520 MW
2000-2010	13,770	13,090	11,840 MW
1010-2020	5,360	4,620	3,880 MW

The construction of nuclear power plants is shown by years when 900-MW nuclear power generating units go on line, and we get the survey given in the table.

Year	V3	V5	Year	V3	V5
1992	900	900 MW	2000	--	900 MW
1993	--	--	2001	--	--
1994	--	--	2002	900	900 MW
1995	--	900 MW	2003	--	900 MW
1996	900	--	2004	--	900 MW
1997	--	--	2005	--	900 MW
1998	--	900 MW	2006	900	900 MW
1999	900	--	2007	--	900 MW

Table (continued)

Year	V3	V5	Year	V3	V5
2008	--	1,800 MW	2010	900	1,800 MW
2009	--	1,800 MW	2010-2020	15,300	22,500 MW

Accordingly, in the period up to the year 2000 it will be necessary to put 3-4 nuclear power generating units on line depending on the variant under consideration, while in the period up to the year 2010 it will be necessary to put on line between 6 and 16 nuclear power generating units of 900 MW apiece. We should emphasize in this connection that it takes 10 to 12 years to build a nuclear power plant.

5. Share of Domestic Sources in the Energy Supply

According to the power balances coking coal, crude petroleum and natural gas will have to be imported. It has been calculated in that connection that 10 percent needs to be added to the imported coking coal for the production of coke. In the period after the year 2000 it is assumed that half of the uranium needed will be imported.

The share of domestic sources in the energy supply is shown in the table.

Year	V3	V5
1985	65.4	64.7%
1990	74.5	74.4%
1995	81.1	81.0%
2000	83.5	82.9%
2010	79.3	74.0%
2020	70.3	65.5%

These figures are valid if, as already mentioned, half of the uranium needed in the period after the year 2000 is furnished from our own deposits. If, however, we assume that it will be possible to obtain all the uranium needed from our own deposits, the share of domestic sources would be as shown in the table.

Year	V3	V5
2010	81.6	78.9%
2020	76.9	75.7%

It is certain that an increase in the share of domestic sources in energy supply, which according to the energy balances could be achieved by the year 2000, will require numerous actions, which we shall be discussing.

6. Necessary Investments

Development of the energy system and especially the electric power system represents the most intensive consumer of investments. That is why optimality in construction of the energy system is extremely important, just as it is important to optimalize the systems built and to operate them efficiently. In our case, for the country as a whole, it can be said that neither optimum construction nor optimalization of the operation of the systems in place have been particularly evident. By way of illustration it is sufficient to mention that with certain exceptions almost every new electric power facility is built by a new group of investors, so that experience does not accumulate, the errors are repeated, and as a result this increases consumption time by an average of 2 years and causes very high cost increases.

Before attempting to determine the investments necessary for development of the branches of fuel and power industry in Yugoslavia according to the projections of development contained in this study, we need to point out certain characteristics of development up to now. The investments made up to now in the branches of the fuel and power industry of Yugoslavia's national economy, as a whole and by branches, indicate a markedly cyclical trend, which has been almost in phase with the cycles of the availability or unavailability (shortage) of energy in our country--of course, with a certain time shift. We should emphasize in this connection that investments in coal and coke also include investments in coking plants, and investments in petroleum include investments in refineries and the oil pipeline, which is still not diminishing the amounts of investments made in exploitation of deposits of coal, petroleum and natural gas.

The development to date confirms that it is possible to achieve a share of investments in the fuel and power industry amounting to about 30-35 percent of total investments in industry and 12-15 percent of total investments in the economy, without disrupting or altering the general structure of investment in Yugoslavia. We should assume, however, that these percentages will be higher for future development, since we have ahead of us in the future not only additional investments for substitution of liquid fuel, but also construction of expensive hydroplants, addition of nuclear power plants, and more expensive coal mines as more stripping is done to create open-cut mines, and so on.

The figures on the share of investments in fixed capital of the branches of the fuel and power industry in the national economy of the entire economy indicate that even up to now the share of the branches of the fuel and power industry has been modest (from 1.72 to 5.34 percent, or an average of 4.02 percent), and an additional indicator confirming that it is possible to appropriate a larger portion of the national income for development of this activity than has been the case up to now. The figures make it possible to frame the argument that a share of about 4-5 percent of investments in the fuel and power industry in the national income (assuming the present economic structure, i.e., without an essential change in the economic structure in view of energy consumption) is the basis of a general policy concerning the investment structure in the national economy.

The structure of sources of financing of investment projects in the energy sectors points specifically to the main defect in policy--the ever greater share of credit (and it is well known that for a long time credits for development of the energy branches have not been given any preferential treatment--credits which taken today diminish accumulation tomorrow, reduce the ability for self-financing, which is indeed inherent in the energy sectors, especially the electric power industry). The previously depressed prices of energy also depress development, so that today even when the prices of energy are "normal," the desired and socially justified development of the fuel and power industry cannot be accomplished.

The figures show that price policy alone will not make it possible to achieve the desired development of the fuel and power industry and that only a pooling of resources by society at a broader level overreaching administrative borders established within Yugoslavia is capable of realizing the measures that would be stimulating to the desired development. For example, only at the level of Yugoslavia is it possible for incentives to be agreed on in the domain of monetary and credit policy.

The determination of the necessary investments for the fuel and power industry by 5-year periods up to the year 2000 is based on the structure of energy consumption envisaged by the energy balances in this study. Since the structure of energy consumption contains certain changes of direction by contrast with what has been in the past, it is obvious, as has already been indicated, that we should assume a somewhat increased share of investments in the fuel and power industry in total investments. Moreover, determination of investments for the fuel and power industry up to the year 2000 is based on the maximum variant of consumption of the fuel and power industry and on approximate specific investments in 1981 prices.

The finished project documentation (hydroplants, coal-fired thermal plants, coal mines, and coal gasification plants), known relations (for example, the relationship between coal-fired thermal electric power plants and nuclear power plants, the relations between investment in production, transmission and distribution in the electric power industry), a study on substitution of liquid fuels, world prices taken from REVUE DE L'ENERGIE for 1980, and estimates served as the basis for ascertaining the specific investments.

The necessary investments in the fuel and power industry up to the year 2000 were calculated on the basis of the growth of quantity or capacity by 5-year periods and the specific rates of investment, as shown below:

1985-1990	602,500 million dinars
1990-1995	751,340 million dinars
1995-2000	935,205 million dinars

It is always a case of investment projects put into operation within the 5-year period in question, which means that in the last 5-year period there are no investment projects representing continuity in construction.

At the same time, proceeding from actual economic investments (558 million dinars) and the national income (1,870 billion dinars) in 1981 (in current prices) and by applying estimates of the growth of the social product according to the maximum variant (Table 2.1), total investments in the economy and national income were calculated up to the year 2000, in permanent 1981 prices, of course.

On the basis of the actual 12.4-percent share of investments in the fuel and power industry in total investments and the 8.8-percent share in the electric power industry, we get the following investments required for the fuel and power industry by 5-year periods:

1985-1990	454 billion dinars
(325 billion for the electric power industry)	
1990-1995	574 billion dinars
(410 billion for the electric power industry)	
1995-2000	712 billion dinars
(509 billion for the electric power industry)	

By applying the actual 4-percent share of investments for the fuel and power industry in the national economy, we get the following necessary investments:

1985-1990	495 billion dinars
1990-1995	625 billion dinars
1995-2000	775 billion dinars

Although these are very rough calculations, a preliminary comparative survey nevertheless allows certain conclusions.

First, we can conclude that the share of investments in the fuel and power industry in the past relative both to investments in the economy and their share in the national income have to increase, since the following facts so argue:

i. that what is left is to utilize much more expensive hydroelectric potential,

ii. that in future drilling to discover petroleum and gas will be far deeper,

iii. that the remaining coal mines have higher investments [original reads "testing"],

iv. that additional investments will have to be made to replace heating oil with alternative fuel.

If we add to the reasons given for the larger investments, and they all have an impact on the electric power industry, the inclusion of nuclear power as a source in which the investments are very expensive, there is logically a larger gap between the investments necessary in the electric power industry and the share which the electric power industry has had in total economic investments by contrast with the gap for the other energy branches.

It is certain that even today's undersupplied Yugoslav coal market and the shortage of electric power indicate inadequate construction of capacity in the energy system, which in turn confirms the conclusions stated.

There is no question that in view of the importance of the supply of energy, there is a need to furnish larger resources to build energy facilities and installations. Nor is there any dilemma that it is possible with optimum construction and optimum operation of the energy systems to achieve large savings, which can be achieved by a number of well studied and consistent organizational undertakings.

7. The Problem of Exhaustion of Domestic Energy Sources

According to the electric power balances prepared up to the year 2000, it will be necessary to commit about one-third of the coal reserves known today, while--if that policy is carried out which was drafted for the future period, up to the year 2000, as an illustration of the possibility--about 80 percent of the coal reserves known today would have to be committed. This means that after the year 2020 coal consumption would have to be diminished considerably in order to cover the supply of coal to those consumers who cannot replace it with other forms of energy.

If we limit ourselves to examining the possibilities up to the year 2000, which, as already mentioned, is the concern of this proposed strategy for development of the fuel and power industry, we cannot speak about exhaustion of the country's energy resources, even if a supply of about 83 percent from domestic sources is achieved, which probably corresponds to the maximum possible supply from domestic sources.

In the period after the year 2000, in spite of the effort to cover the demand with our own sources of energy, the coverage from those sources decreases, so that in the year 2020 about one-third of the energy needed will have to be imported, most of it petroleum. If petroleum is figured at today's prices, it will cost about $15.5 billion to import the energy needed, which is 116 billion dinars (1972 value), which corresponds to about 5 percent of the social product. If coal consumption drops to the level of the year 2000, the need to import energy would be greater, $26.5 billion, or 200 billion dinars, which corresponds to about 8.5 percent of the social product in the year 2020. That would lengthen the life of reserves by about 30 years in view of the lower pace of exploitation.

It certainly is not possible today to set forth a development strategy in the next century, since it depends on the development of new forms of energy (nuclear fusion, breeder reactors, hybrid reactors), on their economic efficiency, on the capability of the country's economy in the context of the availability of foreign exchange and other factors which could have an impact on development of the energy branches.

It is a fact, however, that over the next 40 years or so we can furnish from our own sources more than three-fourths of the energy needed. By the beginning of the third decade of the next century, however, we can anticipate with

rather great confidence the development of new sources of energy whose use will not be so limited by reserves of energy raw materials.

8. Comments on the Energy Balances

The energy balances which have been compiled can be used to define the strategy for development of the fuel and power industry, but the quantifications [original reads "qualifications"] in the energy balances are only rough estimates. This is still more important when we take into account that the energy balances were worked out for differing assumptions concerning development of the social product.

Such estimates, however, provided the only possibility of quantifying to some extent the future consumption of energy and of attempting to find the possibility of satisfying that demand. This procedure had to be adopted, since we have not worked out consistent energy balances for the past period. The only data which have been regularly followed are the data on production, exports and imports. There are no figures on consumption of energy (the reference here is to all forms of energy), and in particular there are no data on the geographic distribution of consumption (among the republics and provinces, the regions of large cities) or on consumption of various groups of consumers. The statistical data gathered up until last year (IND forms) were insufficient for any sort of analysis (the forms of energy were inadequately specified, there is no indication of the purchase for which the form of energy was used), which is not even to mention that these forms were often filled out incompetently and superficially. Only in October 1982 was the first consistent energy balance compiled, and it unfortunately applies only to the year 1981 (Federal Bureau of Statistics).

Flows of energy from the point of exploitation to the point of delivery to consumers were not indicated in preparation of the energy balances drafted in the Federation and the republics, although in the world and indeed our own literature the methods have been developed for preparing energy balances.

The energy balances did indicate flows of energy, but only, as already mentioned, as a first approximation which is supposed to serve as the basis for defining development strategy. It is felt, however, that this is the first step in that job and that it would be useful if the next steps were taken in order to arrive at a consistent energy balance which would also cover the necessary transport of energy, which has not been specifically analyzed in this discussion.

It is felt that the following should be done in the work to come:

a) presentations of the methods of processing all initial data on consumption of energy, on energy conversions and on energy sources, note being taken that the relevant methods have already been developed;

b) reconstruct consumption of all forms of energy by groups (for small consumers in a breakdown by large cities, rural areas and small towns), and by republics and provinces (for the large republics in a breakdown, if possible, by regions as well). This reconstruction should go back several years;

c) compile a resource survey of all energy sources by republics and provinces, indicating the possible pace of development of production capacities and the investments necessary for that development, along with figures on the necessary energy required for exploitation;

d) the possibility of and restriction on construction of installations for energy conversions, accompanied by indication of the resources necessary for construction and data on the energy necessary to operate those installations;

e) possible transportation routes and limits on transport for the various forms of energy, along with figures on transport costs and investments, including data on energy necessary for transport;

f) investments necessary and distribution costs of the forms of energy, along with figures on the energy necessary for distribution;

g) on the basis of these figures and a forecast of energy consumption (which should also take the structure of industry into account), prepare variants of energy supply and, if possible (if all the economic data are available) an optimum variant of energy supply as well, along with a recommendation of measures and actions to achieve that energy balance.

That procedure, which could not be accomplished in a short time, would result in much more reliable balances, making it possible to act with greater certainty. This idea must not be rejected on grounds that this is a lengthy job, since this must become an ongoing activity, since there is a need to constantly follow the changes taking place and the new technical advances.

Section Five. Measures and Actions To Ensure the Supply of Energy

1. Introduction

Although our energy reserves are not very large, and their structure is rather unfavorable (relatively large amounts of low-calorie lignite), they can be a reliable point of support for the country's economic development up to the end of this century, and it is indispensable that the appropriate measures and actions be taken to make up the lag that has occurred up to now in their use in order to attain the goals that have been set. Those actions, however, are not limited solely to development of production capacities and consumption of energy, but they must also include the production of fuel and power equipment. Aside from that, there is a need to guarantee optimum energy use, which we shall speak about in Section Six.

Energy balances have been prepared for the period up to the year 2020 in order to show possible development of the fuel and power industry on the basis of present knowledge and the present state of development of energy technology. Of course, prediction is less and less confident the further the development being forecast is separated in time from the moment when the forecast is being made. It was deemed worthwhile, however, to attempt an analysis of conditions in the distant future in order to examine in some fashion the connection of the shorter period of time to the more remote period of time to follow.

In the fuel and power industry, and indeed in many economic activities, rapid changes are actually not possible, since the life of energy installations is very long (25-30 years) and because it normally does not pay to abandon such installations before they are technically worn out.

That is why it is not possible with any great confidence to predict either the pace of technological development or of new discovery; the forecast of conditions in the next century has only indicative significance, so that actually the development strategy worked out in this study pertains to the period up to the year 2000, even though for the reasons already given it was also worked out for the period up to the year 2020. In the foreseeable future, up to the end of the century, one can hardly anticipate any surprises with respect to technological development, since quite a bit of time will be necessary for the conditions to fall into place for practical use of new sources of energy (nuclear fusion, energy accumulated in dry rocks, solar energy), since their use is now only at the beginning of technological development. This especially applies to possible new discoveries, since--as experience shows--a lengthy period is required from discovery to technological application, especially in the case of discoveries which could have an impact on energy supply. For example, it took some 20 years from discovery of the possibility of breaking down the atomic nucleus to the first nuclear power plant, and almost 40 years from the first chain reaction to the first nuclear power plant in our country. The development of nuclear power has been hastened by military requirements, so that research has been tremendously stimulated, first of all to develop the atomic bomb, and later to build reactors for nuclear submarines.

Aside from that, an analysis extended to the year 2020 was necessary in order to determine how far in time the coal reserves known today would reach, since the pace of construction of nuclear power plants, which, according to experience to date, take some 10 years to build, mainly depends on that.

For all the reasons given the measures and actions which are enumerated in this section pertain first of all to the period up to the year 2000, while the figures for the period between the year 2000 and the year 2020 are only to indicate the further possibility of development.

2. Bituminous or Better Coal

In accordance with the available data, no increase in production of bituminous or better coal is counted on, but exploration for potential deposits of bituminous or better coal must not be neglected.

3. Brown Coal

In the initial period (up to the year 1990) we should assume a slower growth of production of brown coal, since a lengthy time will be needed to increase the capacity of existing mines and to open new ones. Nevertheless, we should envisage intensive investments in development of the production of brown coal over that period.

According to the energy balances, the required production of brown coal would be as follows:

1985 about 11.5 · 10^6 tons
1990 about 13.0 · 10^6 tons
1995 about 16.5 · 10^6 tons
2000 about 20.0 · 10^6 tons
2010 about 21.5 · 10^6 tons
2020 about 25.0 · 10^6 tons

When we look to the reserves known today, at the assumed rate of consumption it is not possible to achieve an annual output of 27 · 10^6 tons which is given as the maximum possible production capacity. However, the figures on probable and possible reserves of brown coal show that usable reserves could be increased through further exploration for brown coal.

At the rate of consumption of brown coal envisaged over the period up to the year 2000 about 40 percent of the reserves known today would be used if we include in that consumption those amounts necessary to operate to the end of their life installations built up to the year 2000. Over the period up to the year 2020, assuming the same conditions, almost 95 percent of the usable reserves of brown coal known today would be consumed.

A study needs to be made of the possibility of a faster growth of brown coal production, since in this way faster substitution of heating oil would be facilitated.

4. Beneficiation of Brown Coal

The briquetting of brown coal increases the heating value and makes it possible for the finer fractions to be used, thereby facilitating transport and handling, and the production of smokeless fuel yields a fuel which for all practical purposes does not pollute the environment. Briquettes can be used for smaller settlements, and the smokeless fuel in the larger settlements.

According to the balances, the following amounts of briquettes and smokeless fuel should be furnished:

1985 about 0.3 · 10^6 tons
1990 about 1.3 · 10^6 tons
1995 about 2.4 · 10^6 tons
2000 about 4.0 · 10^6 tons
2010 about 5.3 · 10^6 tons
2020 about 6.0 · 10^6 tons

5. Lignite Production

Rapid increase of lignite production is one of the key problems in the fuel and power industry. According to the energy balances, the following production of lignite needs to be achieved:

1985 about 54.0 · 10^6 tons
1990 about 81.0 · 10^6 tons
1995 about 124.0 · 10^6 tons
2000 about 155.0 · 10^6 tons
2010 about 245.0 · 10^6 tons
2020 about 280.0 · 10^6 tons

Lignite would be consumed in its natural state practically exclusively for production of electric power. That is, there is justification for supplying lignite in that form only to consumers in the immediate vicinity of the mine.

Certainly further explorations for lignite should not be neglected, since the usable reserves known today are adequate to cover the level of production attained in the year 2020 for only another 10 years or so thereafter, including the additional condition of a supply of lignite to cover the 25-year life of installations built up to the year 2020. If, then, new usable reserves are not discovered, lignite production will have to be reduced to less than one-third of the production achieved in the year 2030 for all the usable reserves known today to be exhausted by the year 2060.

For the period up to the year 2000 we need to furnish about 30 percent of the usable lignite reserves known today. Certainly that amount also includes the lignite necessary to operate the installations already mentioned up to the end of their life.

6. Beneficiation of Lignite

A rapid growth of the production of lignite briquettes has been envisaged, along with a still faster growth of production of synthetic gas from lignite.

Lignite briquettes would be consumed in industry and households in small settlements and rural areas distant from lignite mines, and the synthetic gas in cities for supply of industry and households.

Among the gasification processes that one should be chosen which is most suitable for our lignite, but which facilitates subsequent transition to the production of methane.

According to the energy balances, the following amounts of lignite briquettes and synthetic gas from coal are required:

Year	Lignite Briquettes	Synthetic Gas
1985	about 0.3 · 10^6 tons	about 0.5 · 10^9 m^3
1990	about 1.3 · 10^6 tons	about 3.0 · 10^9 m^3
1995	about 2.5 · 10^6 tons	about 9.2 · 10^9 m^3
2000	about 4.0 · 10^6 tons	about 13.0 · 10^9 m^3
2010	about 5.3 · 10^6 tons	about 17.0 · 10^9 m^3
2020	about 9.0 · 10^6 tons	about 21.0 · 10^9 m^3

The study of lignite gasification needs to be taken up in an organized way, since we still do not have enough personnel who have been involved with this set of problems and because today the technology of coal gasification is undergoing robust development.

7. Exploration for Petroleum and Natural Gas

According to the results of explorations conducted to date, there are considerable potential reserves of petroleum and natural gas both on the mainland and offshore. Confirmation of those reserves and their development constitute one of the key problems in Yugoslavia's fuel and power industry. That is why exploration for crude petroleum and natural gas on our territory should be intensified as much as possible.

According to present estimates, even in the future it will not be possible to meet the demand for crude petroleum from our own fields, and therefore we should continue exploration for petroleum in other countries, furnishing the resources necessary for that purpose.

8. Increased Recovery in the Oil Fields

By using secondary and tertiary methods to drive petroleum from the sedimentary strata (Point 4 in Section Three) it is possible to increase the utilization of existing geological reserves of petroleum. This applies to fields already discovered and also new fields.

That is why it is justified to suitably encourage the use of these methods, since their application makes exploitation of the reservoirs more expensive, and the work organizations are not motivated to apply them, in view of [uz dikan] the sales price of petroleum.

9. Production and Imports of Crude Petroleum

According to the energy balances, the following quantities of petroleum (figures rounded off) are needed:

1985	$17.5 \cdot 10^6$ tons
1990	$17.5 \cdot 10^6$ tons
1995	$18.5 \cdot 10^6$ tons
2000	$19.5 \cdot 10^6$ tons
2010	$28.0 \cdot 10^6$ tons
2020	$42.0 \cdot 10^6$ tons

The amount of imported petroleum required will certainly depend on the possibility for production of crude petroleum. According to present predictions, it is expected that petroleum imports will gradually decline up to the year 2000.

The relatively small growth of petroleum consumption in the period up to the year 2000 has been made possible by gradual reduction of heating oil consumption in industry and by small consumers. In the period after the year 2000

consumption of crude petroleum increases more rapidly, since we do not assume substitution of petroleum products in transportation and agriculture and we do assume a growth of consumption in the petrochemical industry.

Satisfaction of the need for these quantities of crude petroleum depends above all on substitution of other forms of energy (brown coal and natural gas) for heating oil. If, then, that substitution of heating oil does not occur, it will not be possible to satisfy demand with the quantities of crude petroleum envisaged. In addition, a more detailed analysis has shown that consumption of liquefied gas, gasoline and gas oil has been underestimated, so that we can conclude that these needs for crude petroleum represent the lower limit of the demand.

The growth of petroleum consumption after the year 2000 results from increased consumption of those energy derivatives which cannot at the present state of affairs be replaced by other forms of energy (highway and air transportation, agriculture). Moreover, it is assumed that the consumption of derivatives in the petrochemical industry will increase.

10. Production and Consumption of Natural Gas

Taking into account the needs for natural gas as a raw material, total natural gas needs would be as follows:

1985	$6.0 \cdot 10^9$ m^3
1990	$10.0 \cdot 10^9$ m^3
1995	$13.0 \cdot 10^9$ m^3
2000	$15.0 \cdot 10^9$ m^3
2010	$16.0 \cdot 10^9$ m^3
2020	$19.0 \cdot 10^9$ m^3

Detailed analysis should establish the quantities of gas which would have to be imported; that will depend on the envisaged production of natural gas from our own deposits, on the increased production of brown coal, and on development of beneficiation of lignite. Imports from Algeria should be considered along with examination of the possibility of imports from the USSR.

11. Reconciling the Pace of Production and Consumption of Natural Gas

The use of natural gas in households, which is certainly justified both from the standpoint of convenience and the possibility of meeting practically all energy needs in households (except those needs which cannot be met otherwise than with electric power), but also in view of environmental pollution, gives rise to considerable annual fluctuations of consumption. For example, in Zagreb natural gas consumption is sevenfold greater in winter than in summer. That makes it necessary to build up stocks of natural gas in order to bring production into line with the fluctuations of natural gas consumption. Since a large volume of gas is involved, even when the gas is under high pressure, the only practical and economic possibility is to use the depleted gas reservoirs as storage tanks. We should, then, undertake the study of those possibilities and select the most favorable site.

12. Imports of Natural Gas

The terms and conditions under which gas is being delivered from the USSR are very unfavorable, since a uniform rate of delivery is required throughout the entire year, which is possible to achieve in some fashion when the share of imported gas is small compared to the total consumption. If, however, that share is large, payment will have to be made even for unused quantities unless it is possible to build up stocks of the natural gas, since it could happen that predictions on production of natural gas would not be borne out, and it would be necessary then to import larger quantities of that gas.

The problem of importing natural gas, as we have already said, should be specifically studied in the context of detailed energy balances.

13. Reduction of Petroleum Consumption

According to the present state of technical development, consumption of crude petroleum can be reduced to the greatest extent by reducing consumption of heating oil (extralight and all types of heating oil) which are used as ordinary fuel. Reducing consumption of heating oil requires fulfillment of two basic conditions: a) the possibility of purchasing other forms of energy and b) conversion of boilers in power plants in industry, transition to use of other forms of energy instead of heating oil in manufacturing processes (for example, in cement production), which requires partial reconstruction of installations, conversion of boilers for heating entire buildings and entire stories, and replacement of oil furnaces with other types of home furnaces and stoves.

The energy balances envisage a gradual replacement of heating oil by brown coal in the natural state, brown coal in briquettes and smokeless fuel, lignite briquettes and synthetic gas, as well as natural gas. Achievement of the projected production of those forms of energy will fulfill the first condition mentioned for replacement of heating oil by other fuels.

14. Reduction of Heating Oil Consumption in Industry

According to a rough estimate, we have about 800 industrial boilers most of which use heating oil. Many of those boilers were built to be fired with coal, so that their reconversion is probably simpler. It would be worthwhile in the first phase, along with cooperation with boilermaking companies, to study the possibility of their conversion and to draw up a mandatory plan for gradual conversion for the burning of coal or the burning of synthetic or natural gas. For the large boiler installations it would be good to envisage the alternative possibility of burning coal or gas. These conversions should be encouraged with favorable credits or in some other manner.

If, however, it turns out that it is not possible to increase at the projected pace the production of brown coal which is to replace heating oil, we should make provision for importing bituminous or better coal, especially for power installations near the coast or in the vicinity of navigable riverways. There is justification for replacing petroleum with imported coal, since coal costs half as much for the same amount of energy.

15. Reduction of Heating Oil Consumption in the Electric Power Industry

The boiler at TE [Thermal Electric Power Plant] Urinj would be first to come into consideration for conversion of boilers in power plants. It is not possible to shut down a boiler that has already been built, since this would prevent regular supply to consumers in SR [Socialist Republic] Croatia. That is why it is probably most favorable to build a new boiler in that plant to be fired with bituminous or better coal that would be imported. On the world market today the price of the energy contained in coal is less than half that of the energy in crude petroleum. After construction of the second boiler the existing boiler would be converted, also to bituminous or better coal, and at the same time a second power-generating unit would be installed so that in this way the capacity of TE Urinj would be doubled. A part of the energy could be obtained from coke gas, especially if the coking plant at Bakar is expanded. The shipping of brown coal in from SR Bosnia-Hercegovina is out of the question, since, as shown by the energy balances, it should be reserved above all to supply industry and small consumers either in its natural state or in beneficiated form. At the same time, there is no justification from either the economic or energy standpoint to transport natural lignite over a distance of about 800 km. In view of the proximity of potential natural gas deposits, it probably would be ... to envisage boilers at TE Urinj which could be fired with natural gas so as to use surpluses of natural gas which might occur in the summer months.

It would also be necessary to study the possibility of converting other boilers in the heat and power plants in the electric power industry above all to research the possibility of alternative burning of oil, natural gas and heating oil.

Thermal electric power plants fired with heating oil might be used as backup for the Yugoslav electric power system regardless of where those steam plants are located. Achieving that would require an agreement among the electric power industries of the republics concerning their share in covering the fixed and variable costs of those power plants as well as furnishing the necessary amounts of heating oil.

However, until substitution of liquid fuel in steam plants is accomplished, as well as for those steam plants where liquid fuel will not be replaced by other fuels, it will be necessary to furnish as much liquid fuel as required by the production of those steam plants in the electric power system over their life.

16. Reduction of Heating Oil Consumption by Small Consumers

We do not know how many boilers for central heating there are in apartment buildings in which heating oil is used. An inventory should be made up of such boilers, accompanied by their characteristics, so that it would then be possible to draft a plan of measures to replace heating oil with other forms of energy (boiler reconstruction, replacement of boilers).

17. Structure of Consumption of Petroleum Products

According to the energy balances, the following structure is projected for consumption of petroleum products:

Year and Variant		A	B	C	D	E
1985	V3	15.0	11.4	26.5	43.2	3.9%
	V5	15.1	11.4	26.6	43.0	3.9%
1990	V3	18.0	14.0	28.8	35.1	4.1%
	V5	18.1	14.1	29.0	34.7	4.1%
1995	V3	20.9	17.4	31.0	26.2	4.5%
	V5	21.2	17.7	31.6	25.0	4.5%
2000	V3	22.8	19.6	33.4	19.6	4.6%
	V5	23.0	19.7	33.7	19.0	4.6%
2010	V3	23.0	20.7	34.2	17.3	4.8%
	V5	23.1	20.7	34.3	17.1	4.8%
2020	V3	22.9	21.0	33.9	17.4	4.8%
	V5	22.9	20.9	33.9	17.5	4.8%

Note: A--liquefied gas and gasoline; B--primary gasoline; C--jet fuel and gas oil; D--heating oil; E--other.

The greatest change is occurring in consumption of heating oil; the share of other products is increasing in line with reduction of the share of heating oil. The largest increase in the share is envisaged for primary gasoline in line with development of the petrochemical industry.

18. Structure of Production of Petroleum Products

According to the energy balances, there will be a gradual change in the structure of consumption of petroleum products. The basic characteristic of those changes is a reduction in the share of heating oil in total consumption of petroleum products. That share is dropping from about 43 percent in 1985 to about 20 percent in the year 2000, reaching a level of 17 percent, a level that would be retained over the entire period after the year 2000. It would be hard to say, however, without a very detailed analysis, what should be undertaken in petroleum refineries in order to achieve that structure of production which best corresponds to the structure of consumption. A study needs to be made of the possibility of bringing the structure of production into line with the structure of consumption, especially in order to reduce production of heating oil.

It is felt that these changes in structure are not impossible, since in many refineries they are today refining petroleum yielding a share of heating oil less than 30 percent, and in some countries it is even less than 20 percent.

In view of the refining of petroleum required, we will have a surplus of refinery capacity for a long time, some of which is still in the phase of construction. Figures on use of refinery capacity show that in most European countries utilization of refinery capacity is dropping, and that in many

countries the level of utilization of that capacity is indeed very low. Also, in many countries they have not increased refinery capacity in recent years, and in some it has even decreased. Yugoslavia is among the countries in which refinery capacity has been augmented the most over the last 5 years.

Given that situation there is good reason to halt further growth of capacity of refineries, since the prospects of refining petroleum for other countries are not great, since there are unused refineries in many countries.

We should mention in this connection that some of the refinery capacity is already worn out, and some is obsolescent, and all of this should be taken into account when conclusions are drawn about the level of their utilization.

[Second installment of strategy paper prepared by the Energy Subgroup of the Working Group for Drafting the Long-Range Economic Stabilization Program of the Commission of Federal Social Councils for Problems of Economic Stabilization]

[25 Mar 83 Enclosure pp 13-21]

[Excerpts] 19. Coke

According to the balances, coke needs would be:

1985	$2.5 \cdot 10^6$ tons
1990	$3.1 \cdot 10^6$ tons
1995	$3.7 \cdot 10^6$ tons
2000	$4.4 \cdot 10^6$ tons
2010	$6.2 \cdot 10^6$ tons
2020	$9.2 \cdot 10^6$ tons

In all years it was calculated that all the coke needed would be produced in the country, which is why provision was made to import coking coal. In addition, it is also assumed that 10 percent of brown coal would be added to that imported coal.

20. Production of Electric Power

According to the calculations in the study based on the assumed growth of the social product one can assume the following necessary production of electric power:

1985	73- 75 billion kwh
1990	93- 98 billion kwh
1995	117-134 billion kwh
2000	146-176 billion kwh
2010	223-283 billion kwh
2020	330-425 billion kwh

21. Structure of the Output of Electric Power

According to the balances, the approximate structure of electric power output by methods of generation is as follows:

Year and Variant		Coal	Water Power	Nuclear	Other
1985	V3	44.2	42.7	5.2	7.9%
	V5	45.5	41.4	5.1	8.0%
1990	V3	48.0	42.1	4.1	5.8%
	V5	50.7	39.8	3.9	5.6%
1995	V3	47.1	40.2	8.0	4.7%
	V5	53.5	35.0	7.2	4.2%
2000	V3	45.0	37.6	12.6	4.8%
	V5	52.4	31.2	12.4	4.0%
2010	V3	57.0	25.1	14.0	3.9%
	V5	46.2	19.8	30.2	3.8%
2020	V3	40.9	17.3	38.0	3.8%
	V5	29.9	13.3	53.1	3.7%

The category "Other" includes output achieved from heating oil, natural gas and coke gas. We should mention that relatively small amounts of heating oil are needed in lignite-fired steam plants to ignite and maintain the fire, especially when the lignite has very low heating values.

22. Hydropower Plant Construction

It is certainly justifiable to undertake intensive construction of hydroplants, since otherwise the energy of streams is lost irrecoverably and since practically all the equipment for the hydroplants can be produced in our country. After all, in this way we reduce consumption of nonrenewable energy sources and give work to a large number of organizations and workers.

The largest unutilized hydropotential is on the Drina along with the Piva and Tara and their tributaries. Construction of hydroplants on this stream, which has the greatest energy potential and flows through three of our republics, requires an interrepublic agreement which would be of considerable benefit to our fuel and power industry, since it would make it possible to undertake more rapid hydroplant construction on the Drina and tributaries, in a sequence of construction that would ensure the optimum for society as a whole.

According to the electric power balances, the average annual output from all hydroplants in Yugoslavia's electric power system ought to be as follows:

1985	31 billion kwh
1990	39 billion kwh
1995	47 billion kwh
2000	55 billion kwh
2010	56 billion kwh
2020	57 billion kwh

23. Basic Projects for Utilization of Watercourses

The great majority of the basic projects for exploitation of watercourses were prepared some 20 years ago, and the solutions they contain are appropriate to the conditions of that time, when usually there were no problems with buying land, when the prices of fuel (of both coal and petroleum) were low, when transportation routes had not been built in the river valleys, and when the share of hydropower in the system was high, which justified the construction of large storage reservoirs. That is why the basic projects for those streams, which have today been only partially exploited, should be adapted to today's conditions. It would seem that today we should not strive to build large storage reservoirs, since the share of hydropower will be dropping, so that fluctuations in generating capabilities will have less and less impact on conditions in the electric power system. Moreover, the natural distribution of flow in our streams (except on the Drava) is usually in line with the distribution of electric power consumption. This coincidence of distribution is all the better when the share of hydropower in the electric power system is smaller.

When the basic projects are adapted to today's conditions, there is a need to analyze the possibility of building hydroplants with smaller capacities, which were not of interest at the time when the basic hydropower designs were prepared, since it was felt that we had too much waterpower to be concerned with small-capacity installations on the tributaries of the main watercourses.

In determining the sequence for construction of hydroplants consideration should certainly be paid to their economic efficiency so as to achieve the best possible benefit.

When the basic projects are being worked out, attention should be paid to the problems of water supply, the water demand for irrigation, and improvement of flood control.

24. Very Small Hydropower Plants

A study should be made in the context of exploitation of waterpower of building very small hydroplants, which is possible if a survey of small heads is prepared so that the parameters of the standardized equipment can be defined. Such power plants could be economical, that is, only if series-manufactured and standardized units are installed in them, if construction work is simplified to the last degree, when the equipment can operate without being attended, and when high requirements are not imposed with respect to the continuity of operation.

These small hydroplants are of particular and extremely important interest to nationwide defense under wartime conditions. That is, small hydroplants built on small streams dispersed all over the country could furnish electric power to certain consumers whose production has very great importance under wartime conditions, that is, in case of a considerable damage to parts of the electric power system so that the system comes apart.

Hydroplants of this kind, however, are certainly much more expensive (converted to kilowatts or kilowatt-hours) than hydroplants with greater capacity. The smaller the capacity of the small hydroplant and the lower the head being utilized, the greater that difference is.

25. Construction of Conventional Steam Plants

In the periods to come the following capacities should be put on line in conventional steam plants:

1985-1990	about 4,000 MW
1990-1995	3,000- 4,100 MW
1995-2000	3,000- 5,500 MW
2000-2010	12,000-14,000 MW
2010-2020	4,000- 5,500 MW

Over 20 years or so (up to the year 2000) it will be necessary to install and put on line in steam plants between 10,000 and 13,500 MW, and by the end of the year 2000 construction should begin on steam plants with at least 3,000 more megawatts of capacity. This does not include thermal plants which will be in operation in 1985 or those steam plants that will have to be replaced with new generating units because they are worn out.

Because the large lignite deposits are concentrated in relatively small areas, restrictions may occur in construction of steam plants either because of limited amounts of water for cooling (even when closed-circuit cooling is assumed) or because of adverse impact on the environment (sulfur dioxide emission, dust emission). In certain cases we can anticipate a resistance of the public to construction of steam plants, especially in areas where a high concentration of such installations is envisaged. On the one hand there should be a study of the influence of possible restrictions and on the other of devices to reduce the adverse impact on the environment.

The great majority of these units will be set up at lignite mines, and it is possible in all steam plants to set up only one or two types of generating units with the same parameters, from one or two manufacturers, which would reduce the necessary number of spare parts, make it possible to create specialized teams for maintenance and repair, which would reduce downtime.

Up to now almost all the steam plants built over the last 15 years or so have been furnished imported equipment, and that equipment from different manufacturers and with differing parameters. There is no doubt that there is every justification for manufacturing practically all the equipment for steam plants in our own country, which can be done in view of the level of development of our industry, provided the parameters and characteristics of that equipment are stated in advance and that they are binding on investors.

26. Construction of Nuclear Power Plants

According to the energy balances, nuclear power plant construction should begin as follows in coming years:

Year	V3	V5	Year	V3	V5
1983	900	900 MW	1993	--	900 MW
1984	--	--	1994	--	900 MW
1985	--	900 MW	1995	--	900 MW
1986	900	--	1996	900	900 MW
1987	--	--	1997	--	900 MW
1988	--	900 MW	1998	--	1,800 MW
1989	900	--	1999	--	1,800 MW
1990	--	900 MW	2000	900	1,800 MW
1991	--	--	2001-2010	15,300	22,500 MW
1992	900	900 MW			

This is valid assuming that nuclear power plant construction takes 10 years.

Accordingly, the schedule for commencement of construction of 900-MW generating units would be as follows:

by 1985 1-2 plants
by 1990 3-4 plants
by 1996 5-9 plants

depending on actual economic development.

It is most likely that before 1985 we will not begin construction on a nuclear power plant with breeder reactors although by that time such reactors will have been tested in practice, since we will not have a sufficient quantity of plutonium, and it is not very likely that it will be possible by that time to build high-temperature reactors, which are in the initial experimental phase in our country. That is why we must decide on one of the confirmed reactor types, so that the possibilities are either light-water reactors with enriched uranium or heavy-water reactors with natural uranium. Both types have their advantages and faults, but it is certain that the same type of reactor should be chosen for a series of 5-9 nuclear plants (depending on future economic development). Organizations in the electric power industry must not be allowed free choice of reactor type and of the parameters of the power plants, since then we will have a recurrence of what happened with the construction of conventional steam plants. Our industry, that is, will not be prepared to manufacture the necessary equipment, since they did not have sufficient advance information about the parameters of the equipment that was to be installed in the steam plants.

If a timely decision is made about the type of reactors which will be installed in the series of nuclear power plants whose construction is to begin around the year 1995, it will be possible to prepare commencement of design and construction in good time, and our industry will then be able to prepare itself to manufacture the equipment necessary. That is, our industry is capable of manufacturing most of the equipment for nuclear power plants provided that all the necessary elements are defined in good time.

It would seem that the decision should already have been made concerning the choice of reactor type, since the first nuclear power plant is supposed to go on line in 1992 and no later than 1993.

27. Fuel for Nuclear Power Plants

The uranium reserves known today, if predictions are borne out concerning the possible production in the Zirovski Vrh Mine, provide the uranium necessary for another 2-3 nuclear power plants (aside from the Krsko Nuclear Plant), so that it will be necessary to conduct intensive explorations for uranium both within the country and in the developing countries. Explorations in our country were suspended some 15 years ago, and up to this point, except in the region of Zirovski Vrh, they have not been resumed with any intensity, though only a portion of the territory of the SFRY has been explored. There are also prospects of finding sizable uranium reserves in underdeveloped countries, since by and large they have not been explored. This is indicated by the datum that 85 percent of total uranium reserves are located in North America, Africa south of the Sahara and in western Europe, since these are the regions that have been most thoroughly explored. Reserves in the USSR, China and East European countries have not been included in these quantities, since data on uranium reserves are not published.

A study should also be made of methods of obtaining uranium from phosphate and preparations should be made for the application of such methods.

28. A Gas Pipeline Network

The energy balances envisage considerable consumption of both natural and synthetic gas. This will require construction of a gas pipeline network: in one part of the country to transport natural gas and in the other to transport synthetic gas. Since it is not possible in advance to estimate the extent of the different gases, since it depends on available quantities and consumption, it would be worthwhile to study the possibility of linking up these networks into a single gas pipeline system, which would be differently divided into two systems as necessary and which would ultimately, in the more distant future, after transition to production of methane from lignite, operate as a single system. The use of gas, both natural and synthetic, should be oriented toward the petrochemical industry, large and sizable cities for supply of households and industry, since gases are the cleanest fuel and do not pollute the environment after combustion. It is felt, however, that it is not advisable to build a gas distribution network in settlements with low population density.

29. Power Transmission Network

Construction of the third phase of the 400-kv network will round out the transmission network for the level of development of Yugoslavia's electric power system up to about 1985, and perhaps even somewhat beyond that time, depending on the country's economic development. New steam plants will mostly be built in the eastern part of the country (at lignite mines), and more hydroplants will also be built in that area than in other areas, particularly when compared with the western part of the country. At the same time, more nuclear

power plants will be built in the western portion, but that will not be enough to cover supply of consumers in that region, so that there will be ever stronger flows of power from the east to the west of the country, which the 400-kv network that will exist after construction of the third phase will not be sufficient to carry.

There is a need, then, to study the problem of future development of the very-high-voltage network in order to ascertain on the one hand whether the necessary transmission of electric power can be obtained by building more 400-kv lines or whether a higher voltage will have to be provided for, and if the transition to a higher voltage is necessary, it is important to ascertain which.

30. Heating Plant Construction

In heating plants electric power and thermal energy in the form of steam and hot water are produced simultaneously in a combined process. Electric power is generated in that process at considerably lower consumption of energy. Depending on the pressures of live steam and the steam delivered to consumers in the combined process, it takes between 50 and 60 percent of the energy necessary in the condensation process. This kind of production of electric power, however, can be achieved only when there is heat consumption. That is why when the problem of heating plants is examined a distinction should be made between heating plants to supply industrial consumers from heating plants to supply small consumers, above all for heating, which does not exclude the possibility of simultaneous supply of industry and small consumers.

It is undoubtedly justified to build heating plants to supply industry with heat when the consumption of heat at low temperatures is sufficiently large to justify installing a unit to generate electric power. The heating plant's construction is all the more justified the larger the heat consumption and the more uniform its time distribution. It is also favorable to build joint heating plants for several industrial plants, provided they are spatially concentrated. When a heating plant supplies industry, a sufficiently high utilization is achieved, and that justifies their construction.

31. Industrial Heating Plants

We do not have many industrial heating plants, although in industry a sizable amount of energy is needed in the form of process steam (industry in SR [Socialist Republic] Croatia, for example, consumes about 35 percent of total energy in the form of steam). The total output of our industrial thermal power plants, and they are practically exclusively heating plants, since there is no justification whatsoever for industrial condensing plants unless they use waste or exhaust gases as a fuel, was in 1979 5.4 percent of the total electric power generated. That same year the share of industrial thermal power plants was, for example, 13.7 percent in Italy and 19.2 percent in West Germany. There is no doubt that that percentage also depends on the structure of industry.

It would be worthwhile to prepare a survey of industrial power plants and also to analyze the possibility of installing turbogenerator units for combined production of electric power and heat. Construction of industrial heating plants should also be encouraged in all new industrial installations which require substantial amounts of low-temperature heat for processing.

32. Heating Plants To Supply Heat to Small Consumers

By contrast with industrial consumers, small consumers (households, commercial and office space, and so on) need heat above all for heating, and their consumption depends on the air temperature. Small consumers, then, need heat only in the period when space needs to be heated, and under our conditions that is between 130 and 160 days a year. Moreover, the heating plant would have to be scaled so that it can provide the heat necessary even on the coldest days. The production capacity of a heating plant can be reduced by installing a separate boiler which is put in operation in the coldest season of the year. Nevertheless, the degree of utilization of the heating plant's capacity is very low, which considerably increases the costs in view of the high specific investments, which are higher per unit of electric power than for condensing thermal electric power plants. Delivery of the heat, which is delivered to small consumers by means of hot water, requires two parallel insulated heat pipeline networks, one to carry the hot water to the consumer, and the other to return the partially cooled water to the heating plant.

One should be very cautious, then, in planning the construction of heating plants to supply small consumers, since often heating plants are presented as installations which solve problems in generating electric power.

Fuel for heating plants is a particular problem. In our situation only coal comes into consideration as a fuel for heating plants used to supply small consumers. If, that is, it is possible to supply gas (natural or synthetic) to heating plants, it would be more favorable to use the gas directly to heat dwellings. That is, the consumers are supplied in that way at considerably smaller investment and use of the gas is more favorable.

The problem of air pollution in cities is related to the problem of heating plant construction. That is, heating plant construction reduces the emission of harmful ingredients into the atmosphere, since the air pollutants can be removed more effectively from the gases of combustion if combustion is concentrated in large boiler plants than when the fuel is burned in small individual stoves and furnaces. This applies, however, when coal or petroleum products are used as a fuel. When natural or synthetic gas is used even in small individual stoves and furnaces, however, there is practically no pollution of the environment.

33. Oil Shale

In spite of reduced consumption of heating oil, which reduces consumption of crude petroleum, and in spite of the increased production of crude petroleum, we will always have to import this form of energy. At the same time, in the more distant future we must assume higher prices of crude petroleum on the

world market because petroleum reserves are after all limited and because of the ever more expensive exploitation (the new deposits recently discovered are located under the sea). The present situation on the world petroleum market is a consequence of the energy structure, above all the substitution of other forms of energy for heating oil, but also of the economic recession and the emergency reserves created in the most advanced countries. There is no doubt, however, that after the economy adapts to the new conditions and economic activity increases, there will be a new growth of demand for petroleum, which will bring about a further rise of the price, even if consumption of petroleum products is restricted solely to consumption sectors in which at the present state of technology their replacement by other forms of energy is not possible.

According to present conceptions, it is most probable that the use of oil shale (and bituminous sand) will be a real replacement for crude petroleum. There is good reason, then, to explore oil shale and to keep up with development in the world and make preparations for their exploitation.

34. Geothermal Energy

Geothermal energy (use of the energy of the hot water brought to the surface by drilling) is the first of the alternative sources of energy which might be used on a slightly larger scale in our country. For the present, however, there is no organized effort in that direction.

If those possibilities are to be utilized, there is a need to systematize the results of the drilling for petroleum and natural gas done so far from the standpoint of utilizing the geothermal energy, and further explorations have to be organized with respect to using geothermal energy, and if the results are favorable, preparations have to be made for exploitation of the hot water.

However, today there is no work organization to concern itself with these matters. There is a need, then, to commission some existing work organization to take responsibility for those explorations and the preparation for exploitation. These might be electric power organizations or organizations whose business is the distribution of natural gas.

35. Solar Energy

Use of solar energy will not find wide application in the near future. Under our conditions and at the present state of the art solar energy can be used to heat water for personal use in hotels and camps, above all in the area where summer tourism is developed, and then also for heating water in family dwellings and small apartment houses. In all cases, however, equipment for conventional heating are also needed and they must have practically the same capacity as though there were no installation for utilizing solar energy, which means that total investments are increased by these installations.

These installations do reduce consumption of other forms of energy, above all heating oil, and there is good reason to encourage installation of devices to heat water with solar energy by offering more favorable credits or in some other manner.

Residential heating with solar energy is possible for all practical purposes only in family dwellings. Today it is not altogether clear whether this is economically justified, and it would be useful to make experimental installations for research purposes in several family dwellings in different parts of the country in order to get a more reliable picture of the efficiency of such installations.

The present situation as to the possibility of utilizing solar energy does not, however, mean that we should not keep up with research in this field, since equipment of this kind can be applied under special conditions (supplying electric power to isolated equipment, etc.).

36. Wind Energy

It would be worthwhile to make a study of conditions in our country for a number of locations in order to get a more complete picture of wind characteristics, since the possible economic justifiability of energy use depends on those characteristics (frequency of wind speeds, maximum speeds, duration of low wind speeds). Nor should monitoring the development of this technology in the world be neglected.

37. Utilization of Agricultural Waste

Agricultural waste (cornstalks, straw and the like) represents a large renewable potential source of energy. Its utilization, because of its large volume and relatively difficult handling, is no simple matter, but its use could considerably reduce consumption in rural and agricultural regions.

If its large-scale use is to be facilitated, small-capacity boilers will have to be designed to burn the agricultural waste (for driers, schools, large buildings), and there will also have to be devices to produce some kind of briquettes from agricultural waste to be used in small stoves and furnaces. Such installations, which already exist in Vojvodina, should demonstrate how usable these designs are.

It would be worthwhile to familiarize potential users with the experience gained with the devices already built and to adopt suitable measures to stimulate broader use of agricultural waste, especially in farming areas.

38. Use of Livestock Manure

The amassing of livestock manure in enclosed manure tanks can produce a gas that can be used as a fuel without any sort of additional treatment.

The investments involved are minimal, so that use of this procedure is certainly justified on livestock farms of any appreciable size. Several such demonstration facilities should be built, then, so that the first experience is gained and so that their practical value is demonstrated.

39. Equipment for the Fuel and Power Industry

Huge quantities of equipment are necessary for development of the fuel and power industry, and the supply of consumers and indeed economic and social development depend on their punctual supply.

Up to now a sizable portion of equipment for the fuel and power industry has been imported, even when our industry was capable of manufacturing that equipment. Often this was justified by the assertion that the imported equipment was cheaper than domestic equipment, which usually was the case. However, the domestic equipment was more expensive for the investor, but, however expensive it might have been, it was not more expensive for society. The price, that is, included taxes and contributions returned to society to meet the needs for housing, administration, the schools, culture and the like. When goods are imported, by contrast, all the taxes and contributions remain with the other social community.

If the present practice is continued, it is certain that the available foreign exchange to import equipment will become the limiting factor on development of the fuel and power industry and indeed on development as a whole.

It is necessary, then, for industry to prepare itself in good time to manufacture the equipment necessary for the fuel and power industry. It is certain, that is, that our industry can manufacture most of the equipment necessary, provided the needs are defined with sufficient accuracy in advance (with all the technical parameters) and that the industry is certain of finding customers for that equipment.

There is a need, then, for the industry manufacturing equipment for the fuel and power industry to be knitted together and to adopt the most optimum division of labor and for that industry to be put in a position where it can finance the sale of that equipment with credit.

There is also a need for very close collaboration between manufacturers and users of equipment for the fuel and power industry.

That collaboration ought to encompass the following: joint programming and planning of users' growth of capacity, along with adjustment of the development of equipment manufacturers, adoption of standards and standardization of equipment, coordination of research of common interest, and involvement of representatives of users in the design process and in the purchase of licenses.

Section Six. Socioeconomic Relations

1. Energy Prices

The maintenance of low energy prices, which has usually been the case in our country, had the result that not a single branch of the fuel and power industry was able to adapt to the new situation, i.e., to develop so as to keep up with the growth of demand. The coal mines, for example, which for years lived from hand to mouth, were unable to promptly begin investment to expand existing

mines and open new ones immediately when the prices of crude petroleum rose. This was also the case with exploitation of petroleum, and there was a slowing down of development of deposits already discovered and there were hindrances to the financing of explorations. The electric power industry incurred losses because of this rate policy and in order to be able in some fashion to keep up with the growth of consumption, it was forced to finance construction of installations with expensive credits, which augmented the losses even more.

In the process of reproduction every form of energy (electric power, coal, petroleum, that is, petroleum products, etc.) must be basically treated as a commodity. This is a condition for overcoming what is now the adverse effect of economic factors on formation of the price of energy and thereby the strengthened monopoly position of certain branches of the fuel and power industry.

Proceeding from the principles set forth in the Law on the Bases of the Price System and Social Price Control, the price of energy must be an economically realistic value which, honoring objective economic laws, has been arrived at directly through the conclusion of a self-management accord or an agreement reached in the price community that conforms to the agreed price policy, which would contribute to optimum choice of energy, construction of production and other capacities based on economic relations and appropriate energy conservation by all consumers. On that basis it is possible to overcome more effectively the remnants of the overall statist relationship, monopoly tendencies and various forms of regional and sectoral exclusiveness in this field. This is the point of departure for establishing economic relations among the producers of various forms of energy and between them and consumers, as well as for overcoming the very pronounced cost principle in present relations.

It is absolutely necessary to have a joint energy policy that would facilitate a joint price policy, joint planning of long-term production and consumption of energy on the unified Yugoslav market. As a matter of principle unequal valuations of the different sources of energy are unacceptable (one price system is in effect for petroleum, another for coal and a third for electric power), which, along with other factors, results in a nonuniform and unequal economic position of organizations of associated labor in the petroleum industry, the coal mines and the electric power industry, and thereby for the republics and provinces in which those organizations are located, and it also presents optimum selection of sources of energy and their development on the basis of objectified criteria.

Subjective administration of energy prices, regardless of the economic criteria and motives which might possibly lie behind it, has had manifold adverse implications not only for development of the fuel and power industry, but also for the development of the entire economy and overall socioeconomic relations in society, especially in the self-management and social planning of that development. As an objective and real socioeconomic category, energy prices in the system should through the income earned determine the level of simple and expanded reproduction of organizations of associated labor in the fuel and power industry, and the augmented needs for expanded reproduction should be met through a system of accords between producers and consumers concerning construction of the particular sources of energy.

In order to ensure a more lasting orientation of consumers toward the particular forms of energy and to avoid the high cost of frequent changeovers, conservation, more optimum consumption of imported energy and its substitution by domestic energy, we should conduct a price policy, especially price relations among the various forms of energy, on a long-term basis and bring it into line with our general development in economic policy and also diminish the dependence on energy from abroad.

The price of energy as an objective socioeconomic category, regardless of the form it takes, must especially be taken into account in connection with construction of any new project--especially a large consumer. The estimated cost of investment projects, in the case of large consumers for whom energy has not yet been furnished, must in advance make provision for adequate funds for additional sources of energy in order to facilitate regular supply of energy to that future project. This is also the way to bring the development of the fuel and power industry into line with development of social labor as a whole.

The commission took up the following elements and criteria for establishing policy and setting prices which were proposed as a consistent approach by the subgroup for working out a long-range strategy for development of Yugoslavia's fuel and power industry. The commission feels that they can serve as the basis for the competent agencies and self-managing organizations and communities, according to their respective assessments and responsibilities, of course, and in conformity with the principles on the Law on the Bases of the Price System and Social Price Control, to set forth policy and set prices in the process of concluding social compacts and self-management accords concerning prices.

1.1. Coal Prices

Since bituminous or better coal occurs almost exclusively in world trade today, prices fob a seaport in western Europe can be determined only for that rank of coal. In our situation that would be a way of determining the prices only for a negligible amount of coal ($400 \cdot 10^3$ tons), but that parity price could be the basis for setting prices on other ranks of coal. The parity price would be established on the basis of the specialized publications of the OECD or Common Market. It would change if the change of the price of coal on the world market represented 3 percent or more of the price set previously.

The price of domestic brown coal should be derived from the parity price by means of the energy equivalent, with a minimum reduction of the value in calories or even without that reduction.

It is a much more difficult problem to set forth criteria for determining the prices of lignite. Nevertheless, the well-known "world price" of bituminous or better coal must be taken as the basis, and the prices of lignite derived from it by means of the energy equivalent, along with the established penalty system.*

* For example, without claiming that this is a final proposal that ought to be set forth on the basis of expert evaluation of heat and energy experts, lignite with a heating value up to 8.35 megajoules per kilogram (about 2,000

The opinion was expressed in the commission that in the setting of coal prices consideration must be paid to the economically justified factors from the standpoint of ensuring continuity of production and the affirmed development (such as production costs because of differing conditions of production, the quality of energy, etc.), which would be set forth in agreements between producers and consumers in conformity with the established price policy.

The prices of all ranks of coal intended for the production of electric power would have to be under social control.

1.2. Petroleum Prices

In the setting of prices of petroleum and petroleum products on the domestic market the world price must be dominant as a criterion. In principle this also applies to all other forms of energy. Even if sufficient quantities of petroleum were produced in the country, its domestic price would have to range near the level of the world price. Every other form of price of petroleum and petroleum product contradicts the logic of economic laws and present-day conditions for conduct of economic activity.

The same attitude must be taken toward imported petroleum and petroleum produced in the country; domestic petroleum cannot be given different economic treatment from any other strategic commodity, in particular coal, electric power and other sources of energy. The average price of imported petroleum fob the Yugoslav border must be the relative price for domestic petroleum at the parity fob the Yugoslav border. Differences in quality (viscosity) would qualify for a premium or penalty on the basis of the prices of petroleum from the countries producing petroleum in a broad range of quality at fob parity. The price of domestic petroleum would be set on the basis of the movement of prices in the previous quarter calculated at the average mean rate of exchange in that quarter and would remain in effect for the entire current quarter.

1.3. Prices of Petroleum Products

The prices of every form of petroleum product must be based solely on economically optimum elements. All-inclusion in the price of petroleum products of costs which are not economically necessary tends to transform those prices into a subjective category.

The price policy concerning petroleum products should act as a disincentive for organizations of associated labor in the petroleum industry to produce and sell heavy heating oil and should act as an incentive for economically justifiable production of white derivatives. The price policy concerning consumption of black derivatives must act as an economically effective disincentive

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kilocalories per kilogram) might be penalized at 20 percent, for lignite with a heating value between 8.35 and 10.50 megajoules per kilogram (from about 2,000 to 2,500 kilocalories per kilogram) the penalties might be 15 percent, and for lignite with a heating value from 10.50 to 12.50 megajoules per kilogram (from about 2,500 to about 3,000 kilocalories per kilogram) 10 percent. Lignite with higher heating value than 12.50 megajoules per kilogram, as a rule dried lignite, would not be penalized.

on their consumers concerning use of this type of fuel as a source of thermal energy in view of the real possibilities for substitution of that energy.

Prices should also regulate relations of supply and demand of petroleum products on the unified Yugoslav market. In principle when the supply of petroleum products is inadequate on the market, it is still most effective to regulate demand with prices.

The system of net prices of petroleum products (prices not including direct taxes and fees) would be based on the prices of those products in the West European countries, but institutionalized exceptions could be provided for. This also applies in principle to the gross prices of petroleum products (those prices include net prices and all fees, taxes and contributions directly added to the net price). Appropriate social decisions should be adopted on the use of fees, taxes and contributions.

In practice the level of the net prices would be set on the basis of published prices in the member countries of the Common Market at the beginning of every month, and that for the five basic petroleum products: two types of gasoline (regular and high-test), diesel fuel, extralight heating oil (household) and heavy heating oil (for industry).

The prices of all other derivatives would be partially controlled (for example, for primary gasoline, jet fuel, the basic type of asphalt and petroleum coke, for which appropriate criteria would be set forth relative, for example, to gasoline).

1.4. Natural Gas Prices

The basis for prices of natural gas would again be the prices of that form of energy in the West European countries. By contrast with petroleum and petroleum products, it is more difficult to determine natural gas prices precisely.

Since the data available on these prices are not very reliable (when in fact they become known, this is usually quite late), it is proposed that the natural gas price be set on the basis of the average import price of natural gas in Yugoslavia fob the Yugoslav border.

The price of domestic natural gas set in this way does not contain rate policy.

Rate policy ought to be left to distributors, under definite social control, of course.

1.5. Electric Power Rates

The price of electric power must be set in the process of concluding social compacts and self-management accords between producers and consumers of electric power organized in a self-managing community of interest.

The level of average sales prices in the West European countries should be used as the criterion for setting the average sales price of electric power in connection with setting forth the joint economic policy and price policy.

Electric power rates must continue to be under social control.

An endeavor should be made through equal participation of producers and consumers in the process of setting electric power rates for the price level to be stated with the greatest objectivity and economic realism, thereby eliminating the subjective element in costs and other inefficiencies in production, transmission and distribution of electric power, as well as to present those inefficiencies from being passed on to electric power consumers.

Electric power consumers should have an appropriate impact on the policy for expanded reproduction in the electric power industry and toward elimination of a number of shortcomings and inefficiencies during construction of electric power facilities so that electric power rates are not burdened with those unnecessary costs.

The level of electric power rates paid by direct industrial consumers and distributors should be set so as to contain the necessary resources for socially justified development of production and transmission of electric power, but the influences of each of them on the costs which they bring about need to be taken into account in setting rates for various categories of consumers.* In the case of large industrial consumers consideration should also be given to their adaptation to the capabilities of the electric power system (for example, shutting down arc furnaces in periods of low output in hydroplants and high consumption).

If associated labor and society have a particular interest in granting benefits to certain consumers of electric power, this can be achieved through a lower rate than the rate arrived at on the basis of the objective economic criteria, but there must be compensation, which would be paid by those who affirm the existence of a special interest in the preferential price.

Guaranteed and random deliveries should be distinguished in billing for electric power sold between the electric power systems of the republics and provinces.

Guaranteed deliveries are possible only when the supplier system has a surplus of capacity which can cover delivery of power whenever needed by the other system or when the latter system has invested capital to build generating capacities within the supplier system. The amount of the guaranteed electric power is defined by the guaranteed capacity. The price of that power shall be set by agreement between the consumer and the producer or at the producer's average rate at the buses, but such prices may not depart from economic levels.

Random deliveries occur when there is unutilized capacity in one system whose use could reduce the production costs in another system--for example, when increasing production in one system with coal-fired steam plants could reduce production in another system with coal-fired steam plants. The price of such power is equal to half the level of the fuel costs of those two types of steam

* The load diagram, impact on the system's maximum load, seasonal distribution of consumption, distribution of consumption in the course of a day, etc.

plants, which means that the benefit is divided in equal parts between the partners, which acts as an incentive for mutual relations of this kind.

It should be emphasized that this method of billing for electric power achieves in practice optimum operation of the electric power system, even though the electric power systems do not comprise an economically unified system.

The setting of rates on the power which electric power distributors sell to their consumers would in principle be left to those organizations under the control of price authorities, but the rate system ought to be uniform for the republic or province, and if possible for the entire territory of Yugoslavia.

2. The Real Socioeconomic and Social Welfare Position of the Workers in Basic Organizations of Associated Labor in the Fuel and Power Industry

The fact that fuel and power activity is of particular social interest is not and cannot be any sort of impediment to the development and reproduction of the socioeconomic relations of self-management within the industry, but is a need and necessity for achievement of overall relations of self-management. Only consistent pursuit of the particular public interest in the fuel and power industry (the electric power industry, the petroleum industry, etc.) is it possible to express in material terms the social responsibility of the workers in that industry in their management and economic employment of the assets of society concentrated within it, which is the result of social labor as a whole, and not exclusively of the labor of those workers.

In the future effort, then, especially in application of the Law on Associated Labor, consideration should be given to the differing nature and operating conditions in the various branches of the fuel and power industry (for example, in the mines, in hydroplants, in the petroleum industry, etc.).

3. Income in the Fuel and Power Industry

The income of the individual basic organization of associated labor in the fuel and power industry, whose economic structure is very complicated, is not an expression solely of the quality and quantity of current and past labor of those workers and of their management and economic employment of the resources of society, but also of the total capital of society invested in that sector as well as of exceptionally favorable natural and other conditions (Article 18 of the SFRY Constitution and Articles 111 and 124 of the Law on Associated Labor).

The huge capital of society concentrated in the fuel and power industry is not the result of the labor of workers in that sector alone, but also of the current and past labor of workers, working people and citizens outside it. A portion of the income which workers in the fuel and power industry realize on the basis of all the social capital invested, especially when it results from favorable conditions, ought not to be left to those workers to dispose of in the same way as that portion of income which they realize on the basis of their current labor, without clearly defined obligations and responsibilities toward the workers and working people in self-managing organizations and

communities outside the fuel and power industry, especially with respect to expanded reproduction. The total capital of society invested in that sector needs to be constantly revalued so that conditions are created for setting realistic prices and setting forth other conditions for the conduct of economic activity in the field of energy and in order to stimulate the pooling of labor and capital.

It is recommended that the republics and autonomous provinces set forth the bases and scales for establishment and guidance, through their social plans or agreements on the bases of plans, of that portion of income which is the result of labor under exceptionally favorable natural conditions or is the result of exceptionally favorable circumstances on the market or other exceptionally favorable circumstances in the realization of income, which they would do on the basis of jointly stated criteria concerning identification of that portion of income which is the result of exceptionally favorable circumstances.

The most important thing to the future development of socioeconomic relations in the fuel and power industry, and especially in the electric power industry, is to objectify the bases and scales so that participation in joint revenues or income would be in proportion to the contribution in the form of work and in proportion to the continuous supply of power and energy and the work and capital invested.

4. Organization in Conformity With the Principles of Self-Management and Establishment of Mutual Links in the Context of Self-Management

5. Expanded Reproduction

6. Planning

7. Use of Domestic Equipment

Section Seven. Optimalization of Energy Consumption

1. Informing Consumers About Optimum Energy Use

2. Regulations on Measurement of Energy Consumption

3. An Energy Inspectorate To Monitor Optimum Energy Use

4. The Energy Quality Emblem

5. Optimalization of Consumption in Industry

6. Construction of New Industrial Installations

7. Utilization of Waste

8. Longer Service Life of the Products of Industry

9. Products With Low Rates of Energy Consumption

10. Reuse of Containers

11. Optimalization in Transportation

The level of operation of transportation is very low (utilization 20 to 25 percent). This is at the same time the lowest utilization occurring in any of the consumer groups. The reason for this is the very large use of gasoline engines.

People's desire to be more mobile will increase the use of private vehicles with very low efficiency in city driving. Finally, it is not very likely that new technical designs will come into use on a large scale (storage batteries for electric propulsion of highway vehicles, energy stored in rotating masses, etc.).

Reducing energy consumption in transportation requires that changes be made in the tendencies up to this point. From the technical standpoint there has to be reduced impact of air resistance (streamlining), higher axle loads, faster electrification of railroad lines and introduction of new design features (electric cars in cities, rapid transit systems using maglev, etc.). In the context of economic and organizational measures it would be necessary to restrict speeds, to encourage creation of passenger groups and grouping of goods, traffic bans in city zones, introduction of bicycle paths, encouragement of the use of small vehicles, higher gasoline prices, encouragement of travel by rail instead of car and airplane, and orientation toward replacement of gasoline engines by diesel engines. In long-range policy reduction of consumption of energy for transportation can be achieved by appropriate arrangement of cities, by replacing transportation by telecommunications, by reducing travel for recreational purposes by suitable location of recreation centers (for example, revitalizing Sljemen as Zagreb's recreation center), and so on.

12. Freight Transportation

A sizable portion of our freight traffic is carried by highway vehicles. In view of the fact that the main highway routes parallel the main railroad lines, most of that freight traffic could be carried by rail as well. That would mean a sizable saving of energy, since the railroad consumes only about one-third the energy trucks require for the same result in movement of freight.

If that reorientation is to be achieved, however, train speeds will have to be increased, the time between pickup and delivery of freight will have to be shorter, the price of diesel fuel will have to be raised, combined rail-highway transport will have to be organized, and so on.

That energy-saving in rail transportation on electrified lines is still more valuable, since then petroleum products are being replaced by coal and water-power.

13. Insulation of Buildings

14. Temperature in Heated Buildings

15. Energy Required To Produce Energy

Section Eight. Conclusion

1. Past Development and Points of Departure From the Development of the Fuel and Power Industry

The analyses which have been made of the flows and consumption of energy in the country in past years, especially since 1973, and a comparison of flows and energy consumption with other countries in the world allow us to make the following assessments:

i. in our country, by contrast with other countries, since 1973 there has been an increase in the share of petroleum products in total energy consumption;

ii. the share of coal in total energy consumption is continuing to drop in the country;

iii. a gap has been opened between development of industry as an energy consumer and development of the fuel and power industry (which is supposed to furnish energy for that development of industry), which has resulted in very great difficulties in the supply of energy to the consumers that already exist in the country;

iv. sluggishness in adaptation to the new situation in the fuel and energy field has been noticeable in the country's energy system.

In view of these assessments and proceeding from the fact that energy is the basis of economic and social development, the strategy for development of the fuel and power industry has been based on the following premises:

a) maximum possible development of domestic sources of energy;

b) optimum energy use along with steady growth of energy efficiency;

c) maximum possible reduction of energy imports;

d) economically justified utilization of alternative forms of energy;

e) reduction of pollution of the environment, especially in large cities.

2. Main Lines of Development

The main lines of development might be defined as follows:

a) reduction of consumption of crude petroleum, which is to be achieved by gradually replacing heating oil with other forms of energy;

b) increased production of brown coal, which would be used in its natural state as a fuel in industry and households in smaller settlements and as briquettes and smokeless fuels for supply of energy to households in the larger cities [sentence reworked by translator]. Only a minor portion of the brown coal would be used to fire steam plants and in metallurgy;

c) intensive growth of production of lignite, most of which (about three-fourths) would be used to generate electric power, while the remainder would be used to produce synthetic gas and lignite briquettes. The synthetic gas would be used to supply large cities (industry and households), while the lignite briquettes would be used to supply smaller settlements and rural areas;

d) very intensive exploration for crude petroleum and natural gas at all potential sites in the country and abroad;

e) intensive construction of hydroplants on all streams, especially those where hydroplants with large capacity can be built (the Drina with the Tara and Piva, the Neretva);

f) systematic exploration for uranium in order to furnish the amounts necessary to operate nuclear power plants;

g) construction of the power network and gas pipeline network to furnish natural and synthetic gas to consumers;

h) intensive construction of steam plants near lignite mines;

i) selection of a nuclear technology for the nuclear power plants and preparation for construction of several such power plants up to the year 1990, the assumption being that there will be an ever greater need in the future to build nuclear power plants;

j) compulsory construction of industrial heating plants where this is justified in view of the size and constancy of heat consumption;

k) mandatory installation of domestic fuel and power equipment, along with definition of the parameters of that equipment in good time.

3. Continuous Monitoring of Development

The energy balances which have been prepared can be used for defining the strategy in development of the fuel and power industry, but the quantifications in the energy balances are only a first approximation or rough estimate. Such estimates were the only possibility of examining in some fashion the possibility of meeting the energy demand and of determining the possible energy structure. That procedure had to be followed, since no energy balances have been prepared in our country which would afford all the necessary data on energy consumption in the past (consumption by groups and location of consumers,

the purpose for which the energy was used, the use of energy in a breakdown by types of consumers, and so on), yet that is a necessary basis for defining energy policy, since the energy structure cannot be changed overnight and without consideration to past development.

That is why it is indispensable to reconstruct energy balances for several past years and to constantly monitor the development of consumption. To that end a method should be defined for processing all the data concerning energy consumption of all groups of consumers, concerning energy conversions, and concerning energy reserves in the republics and provinces. Forecasts of energy consumption and energy balances should be prepared on the basis of that data, taking into account production capabilities, the necessary energy conversions, the necessary transport of all forms of energy, the resources necessary to build new installations and the necessary costs for energy supply. This procedure, which cannot be carried out in a short time, would result in much more reliable energy balances which could be used not only to define the strategy, but also for making decisions concerning the necessary construction.

4. Activities in the Transitional Period

A large number of administrative decisions in Yugoslavia's fuel and power industry, especially with respect to energy prices, make it difficult to apply the proposed solutions effectively. It is therefore necessary in the transitional period up to the year 1985, while the administrative decisions are in effect, for the sake of effective accomplishment of the strategy governing the long-range development of Yugoslavia's fuel and power industry, to undertake in particular the following measures and activities without delay at all levels of self-management, social and governmental organization:

1) begin to plan construction of new electric power facilities and to build more up-to-date electric power facilities for which the necessary design and investment documentation has been prepared and whose need and economic feasibility have been verified, to complete as soon as possible electric power facilities whose construction is in the final phase or in trial operation. Intensify construction of hydroplants and undertake as soon as possible more rapid construction of hydroplants on the Drina and its tributaries;

2) encourage by available material, technical-technological and other means the production of coal to meet energy needs and to create conditions for faster substitution of liquid fuels by solid fuels. Continue exploration for potential deposits of bituminous or better coal. Intensify investments to develop brown coal production. Speed up the growth of production and beneficiation of lignite, along with intensification of further exploration for lignite;

3) reassess the justifiability of building each new facility that is an energy consumer and for which a supply of energy has not been furnished in advance;

4) intensify exploration for crude petroleum and natural gas on our territory and furnish the resources necessary to continue exploration for petroleum in other countries. Compile a program for reduction of consumption of petroleum

and also heating oil in industry, the electric power industry and by small consumer;

5) undertake in an organized way research on alternative forms of energy;

6) speed up preparations for the anticipated construction of nuclear power plants. Step up exploration for uranium in our country and in the developing countries;

7) improved planning practice in the fuel and power field and devise a uniform methodology for compiling energy balances;

8) coordinate overall organization in the fuel and energy sector and take the initiative for formation of a social council for energy;

9) draw up a schedule for eliminating price disparities and for achieving price relations in the fuel and power industry so that those relations begin to be realized even in 1983, consideration being paid to the priority tasks which have been enumerated;

10) conclude a social compact on the conditions for organizing basic and work organizations in the fuel and power industry;

11) organize timely encouragement of efforts to bring general self-management acts in organizations of associated labor in the fuel and power industry into conformity with the Law on Expanded Reproduction in Past Labor;

12) improve the information system in the fuel and power field;

13) create energy inspectorates where necessary and create conditions for their more effective and responsible work;

14) reconcile enactments in the fuel and power sector;

15) take measures to encourage scientific research in the fuel and energy field.

Tables

Table 2.1. Projected Average Growth of the Social Product (%)

Year	V3	V4	V5
1980/1985	3.00	3.50	3.50
1985/1990	3.50	4.00	4.00
1990/1995	3.50	4.00	5.00
1995/2000	3.50	3.75	4.50
2000/2005	3.40	3.50	4.00
2005/2010	3.30	3.40	3.75
2010/2015	3.20	3.30	3.50
2015/2020	3.10	3.20	3.25

Table 2.2. Projected Social Product (per capita social product, in 10^3 dinars)

Year	V3	V4	V5	Population (10^6)
1980	17.30	17.30	17.30	22.344
1985	20.06	20.55	20.55	23.236
1990	23.82	25.00	25.00	24.107
1995	28.29	30.41	31.91	24.908
2000	33.60	36.56	39.76	25.653
2005	39.71	43.42	48.37	26.420
2010	46.71	51.32	58.15	27.211
2015	54.68	60.37	69.08	28.024
2020	63.70	70.67	81.06	28.863

(social product, in 10^9 dinars)

Year	V3	V4	V5
1980	386.6	386.6	386.6
1985	466.1	477.5	477.5
1990	574.2	602.7	602.7
1995	704.6	757.5	794.8
2000	861.9	937.9	1,020.0
2005	1,049.1	1,147.2	1,277.9
2010	1,271.0	1,396.5	1,582.3
2015	1,532.4	1,691.8	1,935.9
2020	1,838.6	2,039.7	2,339.6

Table 2.3. Energy Requirement According to the Projected Growth of the Social Product (per capita energy requirement, in kilograms of equivalent coal)

Year	V3	V4	V5
1980	2,190.4	2,190.4	2,190.4
1985	2,492.9	2,546.6	2,546.6
1990	2,905.0	3,034.3	3,034.3
1995	3,394.9	3,672.2	3,791.6
2000	3,976.9	4,301.3	4,652.0
2005	4,646.5	5,053.1	5,595.7
2010	5,413.7	5,919.0	6,667.5
2015	6,287.2	6,910.9	7,865.5
2020	7,275.8	8,039.7	9,178.5

(energy required, in 10^6 tons of equivalent coal)

Year	V3	V4	V5
1980	48.94	48.94	48.94
1985	57.91	59.17	59.17
1990	70.03	73.15	73.15

Table 2.3 (continued)

Year	V3	V4	V5
1995	84.56	90.35	94.44
2000	102.02	110.34	119.34
2005	122.76	133.50	147.84
2010	147.31	161.06	181.43
2015	176.19	193.67	220.42
2020	210.00	232.05	264.92

Table 2.4. Energy Consumption in Kilograms of Equivalent Coal Per Dinar of the Social Product in Yugoslavia (1972 value of the dinar)

1970	0.1317
1971	0.1390
1972	0.1322
1973	0.1311
1974	0.1313
1975	0.1301
1976	0.1302
1977	0.1301
1978	0.1299
1979	0.1257
1980	0.1266

Year	V3	V4	V5
1985	0.1243	0.1239	0.1239
1990	0.1220	0.1214	0.1214
1995	0.1200	0.1193	0.1188
2000	0.1184	0.1177	0.1170
2005	0.1170	0.1164	0.1157
2010	0.1159	0.1153	0.1147
2015	0.1150	0.1145	0.1139
2020	0.1142	0.1138	0.1132

Table 2.5. Necessary Production of Electric Power on the Basis of the Projected Growth of the Social Product (per capita electric power requirement, in kwh)

Year	V3	V4	V5
1980	2,601.1	2,601.1	2,601.1
1985	3,126.8	3,220.2	3,220.2
1990	3,843.1	4,067.9	4,067.9
1995	4,694.8	5,098.5	5,384.3
2000	5,706.2	6,270.0	6,879.7
2005	6,870.2	7,576.9	8,519.9
2010	8,203.7	9,081.9	10,383.0
2015	9,721.9	10,805.9	12,465.1
2020	11,440.3	12,768.0	14,747.3

Table 2.5 (continued)

(electric power requirement, in billions of kwh)

Year	V3	V4	V5
1980	58.12	58.12	58.12
1985	72.65	74.82	74.82
1990	92.67	98.06	98.06
1995	116.94	126.99	134.11
2000	146.38	160.84	176.48
2005	181.51	200.18	225.10
2010	223.23	247.13	282.53
2015	272.45	302.82	349.32
2020	330.20	368.52	425.65

Table 2.6. Electric Power Consumption in Kilowatt-Hours Per Dinar of the Social Product in Yugoslavia (1972 value of the dinar)

1970	0.1204
1971	0.1246
1972	0.1349
1973	0.1360
1974	0.1411
1975	0.1391
1976	0.1454
1977	0.1458
1978	0.1459
1979	0.1453
1980	0.1504

Year	V3	V4	V5
1985	0.1558	0.1567	0.1567
1990	0.1613	0.1627	0.1627
1995	0.1660	0.1677	0.1687
2000	0.1698	0.1715	0.1730
2005	0.1730	0.1745	0.1761
2010	0.1756	0.1770	0.1786
2015	0.1778	0.1790	0.1704
2020	0.1796	0.1807	0.1816

Table 2.7. Necessary Energy, Including Firewood (in 10^6 tons of equivalent coal)

Year	V3	V4	V5
1980	50.20	50.20	50.20
1985	59.71	60.43	60.43
1990	71.29	74.41	74.41
1995	85.82	91.61	95.70

Table 2.7 (continued)

Year	V3	V4	V5
2000	103.28	111.60	120.60
2005	124.02	134.76	149.10
2010	148.57	162.32	182.60
2015	177.45	194.93	221.68
2020	211.26	233.31	266.18

Table 3.1. Total Coal Reserves in Yugoslavia (in 10^6 tons)

Indicator	Actual Reserves	Probable Reserves	Possible Reserves	Total	Heating Value, MJ/kg
Bituminous or better coal					
SR Croatia	14	16	8	38	25.12
SR Serbia	47	1	29	77	25.98
Total	61	17	37	115	25.71
Brown Coal					
SR Bosnia-Hercegovina	1,128	293	465	1,886	15.14
SR Slovenia	75	13	84	172	13.31
SR Serbia	75	29	286	400	15.01
Total	1,278	335	845	2,458	14.99
Lignite					
SR Bosnia-Hercegovina	2,118	766	694	3,578	10.82
SR Montenegro	140	35	255	430	10.29
SR Macedonia	499	8	113	620	7.18
SR Slovenia	243	427	--	670	9.99
SR Serbia	10,273	142	3,877	14,292	7.76
Breakdown:					
Serbia proper	2,776	142	2,130	5,048	7.76
SAP Kosovo	7,302	--	1,281	8,583	7.77
SAP Vojvodina	195	--	466	661	7.76
Total	14,612	1,730	5,821	22,163	8.62
Grand total	14,612	1,730	5,820	22,163	9.25

Note: The figures on heating value were taken from the detailed study entitled "Possible Fuel Production ...--Separate Publication for Coal," published by the Mining Institute, Zemun, Belgrade, 1976.

Table 3.2. Petroleum and Gas Reserves in Yugoslavia

Indicator	Potential Reserves, 10^6 tons of equivalent petroleum	Geological Reserves (A + B + C_1)			
			Natural Gas		Total, 10^6 tons of equivalent petroleum
		Petroleum, 10^6 tons	Casinghead, 10^9 m^3	Dry, 10^9 m^3	
Mura Depression	125.9	0.8	0.1	0.1	1.0
Drava Depression	231.9	82.7	6.7	44.1	133.5
Sava Depression	710.3	159.3	17.0	14.9	191.2
Northern Adriatic	1,185.0	--	--	7.0	7.0
SR Croatia	2,253.1	242.8	23.8	66.1	332.7
Banat	195.4	91.8	7.0	37.8	136.6
Backa	54.6	28.8	1.8	5.9	36.5
Srem	5.0	--	--	--	--
Serbia proper	15.0	--	--	--	--
SR Serbia	270.0	120.6	8.8	43.7	173.1
Grand total	2,523.1	363.4	32.6	109.3	505.8

Note: The potential reserves embrace A, B, C_1, C_2, D_1 and D_2 reserves.

Table 3.3. Forecast of Petroleum Production in Yugoslavia (in 10^6 tons)

Year	Domestic Petroleum		Foreign Concessions	Total
	Pannonian	Adriatic		
1985	5.00	--	--	5.00
1990	3.60	1.40	2.00	7.00
1995	2.62	2.88	3.00	8.50
2000	1.96	4.04	4.00	10.00
2010	...	...	...	8.00-12.00
2020	...	...	...	8.00-12.00

Table 3.4. Forecast of Natural Gas Production in Yugoslavia (in 10^9 m^3)

Year	Pannonian	Adriatic	Total
1985	4.05	1.00	5.05
1990	4.50	3.90	8.50
1995	4.70	5.50	10.20
2000	4.20	8.00	12.20
2010	...	...	12.00-14.00
2020	...	...	12.00-14.00

Table 3.5. Refinery Capacity in Yugoslavia (in 10^6 tons of petroleum annually)

Refinery	1980	1985
Bosanski Brod	2.15	4.20
Lendava	0.70	0.70
Novi Sad	1.00	3.00
Pancevo	5.53	5.50
Skopje	--	2.50
Rijeka	8.00	8.00
Sisak	6.70	6.70
Total	24.08	30.60

Table 3.6. Petroleum Products Required for Nonenergy Purposes (in 10^6 tons)

Products	1985	1990	1995	2000	2010	2020
Primary gasoline for olefin petrochemistry	2.10	2.10	3.00	4.00	4.00	4.00
Primary gasoline for aromatic petrochemistry	1.00	1.25	1.00	2.00	2.00	2.00
Other (solvents, petroleum coke, carbon black)	0.20	0.25	0.30	0.35	0.35	0.35
Total	0.30	3.60	4.80	6.35	6.35	6.35

Note: An increased requirement was not taken into account for the period after the year 2000.

Table 3.7. Duration of Wind Speeds (in hours/year)

Speed, m/sec	Belgrade	Dubrovnik	Vrsac	Zlatibor
0.0- 0.9	572	272	3,355	823
1.0- 1.9	2,512	1,104	1,040	2,798
2.0- 2.9	2,277	1,454	1,207	1,891
3.0- 3.9	1,514	1,820	753	1,127
4.0- 4.9	815	1,113	450	743
5.0- 5.9	444	752	371	562
6.0- 6.9	301	587	265	369
7.0- 7.9	185	471	192	188
8.0- 8.9	81	356	168	108
9.0- 9.9	33	233	153	57
10.0-10.9	9	183	159	43
11.0-11.9	4	132	129	18
12.0-12.9	5	92	125	11
13.0-13.9	2	82	126	8
14.0-14.9	3	46	93	5
15.0-15.9	2	31	57	4
16.0-16.9	--	18	54	3

Table 3.7 (continued)

Speed, m/sec	Belgrade	Dubrovnik	Vrsac	Zlatibor
17.0-17.9	1	7	45	1
18.0-18.9	--	4	17	--
19.0-19.9	--	2	6	--
20.0-20.9	--	1	5	1

Table 4.1. Electric Power--Generated and Delivered to Consumers (in billions of kwh)

Variant V3

Indicator	1985	1990	1995	2000	2010	2020
Production						
Hydro	31.00	39.00	47.00	55.00	56.00	57.00
Thermal	37.85	49.87	60.58	72.88	136.08	147.65
Nuclear	3.80	3.80	9.36	18.50	31.15	125.55
Total	72.65	92.67	116.94	146.38	223.23	330.20
Internal consumption						
Hydro	0.31	0.39	0.47	0.55	0.56	0.57
Thermal + nuclear	3.33	4.29	5.60	7.31	13.38	21.86
Total	3.64	4.68	6.07	7.86	13.94	22.43
Delivered to consumers						
At buses	69.01	87.99	110.87	138.52	209.29	307.77
Losses	8.28	10.56	13.30	16.62	25.11	36.93
Billions of kwh	60.73	77.43	97.57	121.90	184.18	270.84
Kilograms of equivalent coal	7.47	9.52	12.00	14.99	22.65	33.31

Variant V5

Production						
Hydro	31.00	39.00	47.00	55.00	56.00	57.00
Thermal	40.02	55.26	77.28	99.58	141.20	142.82
Nuclear	3.80	3.80	9.83	21.90	85.33	225.83
Total	74.82	98.06	134.11	176.48	282.53	425.65
Internal consumption						
Hydro	0.31	0.39	0.47	0.55	0.56	0.57
Thermal + nuclear	3.51	4.72	6.97	9.72	18.12	29.42
Total	3.82	5.11	7.44	10.27	18.68	29.99
Delivered to consumers						
At buses	71.00	92.95	126.67	166.21	263.85	395.66
Losses	8.52	11.15	15.20	19.95	31.66	47.48
Billions of kwh	62.48	81.80	111.47	146.26	232.19	248.18
Kilograms of equivalent coal	7.69	10.06	13.71	17.99	28.56	42.83

Table 4.2. Energy Delivered to Consumers (in 10^6 tons of equivalent coal)

Variant V3

Indicator	1985	1990	1995	2000	2010	2020
Energy requirement	59.71	71.29	85.82	103.28	148.57	211.26
Energy to produce electric power						
Hydro	3.81	4.80	5.78	6.77	6.89	7.01
Thermal	15.90	20.45	24.53	29.15	53.75	58.32
Nuclear	0.80	0.80	1.97	3.88	6.54	26.37
Total	20.51	26.05	32.28	39.80	67.18	91.70
Requirement without electric power	39.20	45.24	53.54	63.48	81.39	119.56
Delivered to consumers						
Electric power	7.47	9.52	12.00	14.99	22.65	33.31
Other	36.83	42.63	49.52	57.62	74.00	108.01
Total	44.30	52.15	61.52	72.61	96.65	141.32

Variant V5

Energy requirement	60.43	74.41	95.70	120.60	182.60	266.18
Energy to produce electric power						
Hydro	3.81	4.80	5.78	6.77	6.89	7.01
Thermal	16.30	22.15	31.30	39.83	55.77	56.41
Nuclear	0.80	0.80	2.06	4.60	17.92	54.42
Total	20.91	27.75	39.14	51.20	80.58	117.84
Requirement without electric power	39.52	46.66	56.56	69.40	102.02	148.34
Delivered to consumers						
Electric power	7.69	10.06	13.71	17.99	28.56	42.83
Other	37.37	44.04	52.95	63.53	92.76	132.83
Total	45.06	54.10	66.53	81.52	121.32	175.66

Table 4.3. Energy Delivered to Groups of Consumers

Variant V3

Year	IN	PR	PO	MP	NE	Total
1985	16.75	6.87	2.21	14.14	4.03	44.30
1990	19.71	8.03	2.71	16.85	4.85	52.15
1995	23.07	9.41	3.38	19.75	5.91	61.52
2000	27.01	11.04	4.14	23.23	7.19	72.61
2010	34.89	14.59	6.28	30.74	10.15	96.65
2020	49.46	21.34	10.32	44.66	15.54	141.32

Table 4.3 (continued)

Variant V5

Year	IN	PR	PO	MP	NE	Total
1985	17.03	6.99	2.25	14.60	4.10	45.06
1990	20.45	8.33	2.81	17.48	5.03	54.10
1995	24.95	10.18	3.66	21.35	6.39	66.53
2000	30.32	12.30	4.65	26.09	8.07	81.52
2010	43.80	18.32	7.88	38.58	12.74	121.32
2020	61.48	26.53	12.82	55.51	19.32	175.66

Table 4.4. Production in Thermal Plants According to the Fuel (in billions of kwh)

Variant V3

Indicator	1985	1990	1995	2000	2010	2020
Bituminous or better coal	1.02	1.05	1.06	1.08	1.09	1.09
Brown coal	3.69	3.78	5.06	6.38	6.46	6.46
Lignite	27.38	39.67	48.95	58.47	119.78	127.34
Natural gas	1.52	0.98	0.99	1.25	1.26	1.26
Waterpower	31.00	39.00	47.00	55.00	56.00	57.00
Nuclear fuel	3.80	3.80	9.36	18.50	31.15	125.55
Coke gas	0.43	0.49	0.57	0.70	0.91	1.37
Heating oil	3.81	3.90	3.95	5.00	6.58	10.13
Total	72.65	92.67	116.94	146.38	223.23	330.20

Variant V5

Bituminous or better coal	1.06	1.07	1.06	1.08	1.09	1.09
Brown coal	3.81	3.87	5.06	6.38	6.46	6.47
Lignite	29.21	44.81	65.60	85.09	123.09	119.59
Natural gas	1.57	1.00	0.99	1.25	1.27	1.27
Waterpower	31.00	39.00	47.00	55.00	56.00	57.00
Nuclear fuel	3.80	3.80	9.83	21.90	85.33	225.83
Coke gas	0.44	0.52	0.62	0.78	1.19	1.75
Heating oil	3.93	3.99	3.95	5.00	8.10	12.66
Total	74.82	98.08	134.11	176.48	282.53	425.65

Table 4.5. Required Installed Capacity of Power Plants (in MW)

Variant V3

Year	Hydro	Thermal	Nuclear	Total
1981	6,253	8,094	664	15,011
1985	8,380	10,329	664	19,373
1990	10,540	13,182	664	24,386

Table 4.5 (continued)

Year	Hydro	Thermal	Nuclear	Total
1995	12,800	15,545	1,560	29,985
2000	15,400	18,112	3,083	36,595
2010	16,720	31,878	5,192	53,790
2020	28,600	37,239	20,952	76,791
Variant V5				
1981	6,253	8,094	664	15,011
1985	8,380	10,329	664	19,373
1990	10,680	14,461	664	25,805
1995	14,200	18,549	1,638	34,387
2000	15,950	23,975	3,650	43,575
2010	17,230	35,818	14,222	67,270
2020	19,400	39,701	37,638	96,739

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END